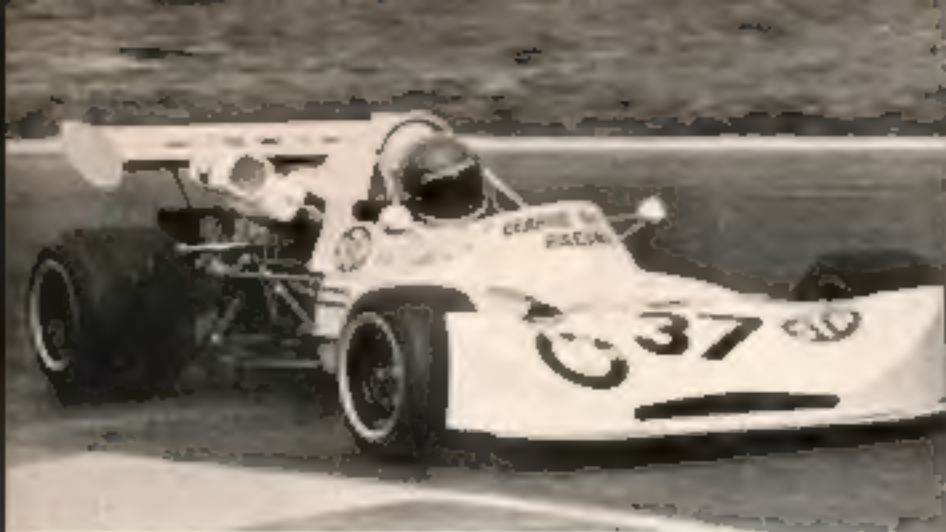


ED ALEXANDER INTERVIEW - TURBOCHARGING - QUIZ

AUTOSPORT

F2 Survey: Jarier's March-BMW steals the show





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Matra MS 670B.

1st Rothmans European F5000 Championship,
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1st European F2 Championship,
J.P. Jarier, STP March 732.

1st John Player F3 Championship,
Tony Brise, March 733.

1st Forward Trust F3 Championship,
Ian Taylor, Baty March 733.

1st Lombard NC F3 Championship,
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1st Shellsport Clubmans Championship,
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AUTOSPORT

BRITAIN'S MOTOR SPORTING WEEKLY

December 20 1973 Volume 53 No 12

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Enforcing the 50 mph speed limit at Silverstone last week? A policeman shows interest in Jarier testing the F2 March before interviewing him about an alleged driving offence.



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AUTOSPORT, DECEMBER 20, 1973

EDITORIAL

Action from the CSI

Although Paris itself showed little sign of there being any problems with fuel supply last weekend, the annual CSI press conference was pre-occupied with it. The mood however was optimistic as had been indicated the previous week during the CSI's meeting with the F1 constructors. The FIA recently asked its sub-committee, the CSI, to prepare and propose such measures as could be adapted to the situation.

The CSI have acted rapidly and sensibly to this request. The report says that motor sport should, public spiritedly, contribute to the economic effort resulting from the energy crisis. Accordingly they have taken four measures to ensure that racing will continue.

The first is to urge all national sporting authorities to immediately take measures to reduce the fuel consumption. Secondly for 1974, the CSI will co-operate in the economy effort by reducing, by a considerable percentage (a minimum of 25 per cent), the quantity of fuel necessary for championship events. Thirdly the national sporting authorities are left complete freedom in the planning of their programme of utilisation by closed circuits, and are requested to put these installations at the disposal in priority, of the industry, for research into both petrol economy and new fuel. Lastly the CSI is immediately forming a group of experts who will be entrusted with the detailed elaboration of this economic policy as well as the study of different forms of sporting activity and eventually, new types of carburants adaptable to the energy situation.

From this the impression is definitely that international racing will continue. The F1 constructors have agreed to cut the Grand Prix practice sessions by half for their part. If the 25 per cent cut was applied to sports car racing it may mean the 18 hours of Le Mans and similar but what is important is that racing will happen.

A number of constructors we have spoken to this week, are carrying on with their development and building programme for the international formulae and we can all take heart from this.

As far as this country is concerned we have to keep national racing alive. Of the 34,500 licence holders the majority are concerned with competing in this country and it is them that primarily keep the industry going. In that light, the cancellation of the Boxing Day Brands meeting comes as a setback.

There was a meeting at the RAC (on Wednesday) with all the interested parties present, to establish a policy in keeping the domestic scene alive. Last week the RAC also announced that they were forming an action committee to form all the statistics and relevant information to present to the Government a water-tight case for the continuance of enough motor sport to keep the industry intact. It will have representatives of the RAC, the SMMT, the F1 association, the circuit owners and association of competition car manufacturers working speedily in obtaining this information. Certainly action is now taking place and it's certainly needed for if things were left much later, we would still be in a state of confusion by the start of the season in March.

our cover picture

European Formula 2 champion Jean-Pierre Jarier with the works March-BMW. The full story on this year's series by Ian Phillips starts on page 24.
Photo: Philips Photographics

Richard Roberts' F1 Brabham...

Richard Roberts will drive the second works Brabham in Formula One next season. This was announced by Bernie Ecclestone on Monday. Carlos Reutemann will of course be the number one driver for the team which will use the new Brabham BT44 announced below.

Roberts, who is 29 and married, has been racing since 1969 and really came to the fore this year in a Myson sponsored GRD and March in F3.

Ecclestone said of his choice: "After carefully combining through the possibilities available to us we decided to pick a young, up-and-coming driver and take a chance on success. It was not an easy decision to make, but Richard's performances—particularly in the latter part of the year, when he had a competitive car—were very convincing.

"It is a big jump from Formula

3 to Formula 1, but we hope that Richard will be able to do several hundred miles in the car before the start of practice for the Argentine Grand Prix. We are not expecting any fireworks from him on his first outing; in fact we will be quite happy if he qualifies."

During the past few weeks Roberts has been testing the Formula Two Brabham which Wilson Fittipaldi drove this year. His big break with Brabham occurred at the final round of the Lombard North Central F3 championship round at Brands Hatch when Richard drove his best race to beat Tony Brise and the whole performance was watched by Bernie Ecclestone who was seen to speak at great length with him in the Grovewood Suite afterwards.

The win at Brands Hatch gave him enough points to tie with

Tony Brise for the Lombard championship while earlier in the year he had taken third in the Forward Trust championship.

Roberts started his racing career with a bitza Lagonda which he used to good effect in the middle and late '60s.

In 1969 a friend Bruce Giddy introduced him to FF and he raced a Ginetta under the Giro Racing banner. The following year Giddy purchased a Palliser and then an Elden followed in 1972 which was used successfully and produced a number of victories.

As regards this year's other Brabham Formula 1 drivers, Bernie Ecclestone was non-committal although he admitted a possibility of running both Wilson Fittipaldi and Andrea de Adamich from the factory, not necessarily as works drivers however.



Richard Roberts—big chance.



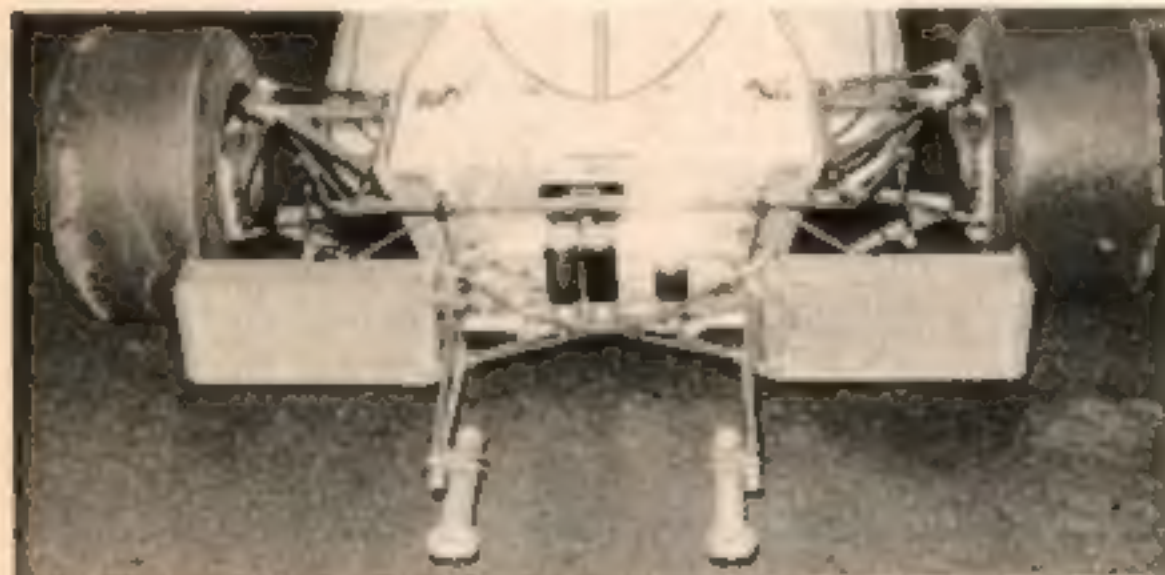
Gordon Murray—director.

...new BT44 announced

Motor Racing Developments announced their new Brabham BT44 F1 this week to coincide with the announcement about Richard Roberts joining the team.

The new F1 car, designed by Gordon Murray, is a direct development of the BT42 and complies with the latest FIA regulations regarding deformable structures, fuel system and

weight. The new chassis retains the triangular section, weight distribution, and basic layout of the BT42, the aim being to capitalise on the results of development work carried out during the course of the 1973 season. This also means that the fuel is carried very low, and that the centres of gravity of the chassis and fuel load coincide.



The front suspension is all new incorporating variable rate characteristics.

The BT44 has a new nose and high cockpit surround which merges into the airbox.



The full width nose houses twin radiators, as on the 42 but in revised positions, and the cockpit section runs on to become an airbox and engine cover, the airbox being cranked forward to leave an undisturbed flow to the rear wing.

Aerodynamics played a major part in the design of the BT44. The frontal area is small by current F1 standards, and all forward facing surfaces are designed to force air over the car rather than under it.

In the interests of driver safety, all fuel tank access holes and connections have been kept out of the cockpit area. All electrical lines are fireproof and run in metal access channels within the chassis structure. The driver is further protected by two complete steel frames in the footwell area, which will absorb extremely high point loads in the event of an accident.

The method used to construct the deformable structure sandwich on the BT42 has been retained, having proved itself to be outstandingly strong during the 1973 season.

The rear suspension remains the same as the BT42, using the engine to absorb suspension loads

through an MRD casting on the rear face of the cylinder block. Two track variations are available, 57 in or 60 in. Front and rear wheels are of a new design. The rear upright castings and driveshafts are angled forward to suit suspension mountings on the engine and to retain a favourable rearward weight bias.

The front suspension is completely new, having variable rate characteristics; the rate change is fully adjustable. The upright and front hub design are new and can accept components suitable for an inboard brake layout. The coil/spring/damper unit is mounted in a semi-inboard position and is operated via a chassis pivoted lever and an adjustable tie rod which is attached to the outer end of the top wishbone.

The fuel system uses aircraft-type connections throughout and the single outlet pipe feeds through an MRD self-sealing coupling. The total fuel capacity is 42 gallons.

With the introduction of the new BT44, Bernie Ecclestone also announced that designer Gordon Murray has recently become a director of MRD. Former director Colin Seeley is no longer with the firm, which is now involved wholly with F1 racing and has ceased to make production cars for other categories—though spares will continue to be available for owners of earlier models. This step has been under consideration for some time, and was finally precipitated by the energy crisis and the uncertainties to which it has given rise.

Pit and Paddock

CSI announce plans for fuel economy

Fuel economy was the seemingly unrealistic topic of conversation at the CSI's Press Conference on Saturday, for outside the AC de France's overheated headquarters the Parisian traffic was jammed up as usual in the glare of the city's undimmed Christmas lights.

The conference preceded the annual FIA prize-giving, and was used principally to announce the measures taken by Motorsport's governing body to co-operate in fuel economies. The FIA recently asked the CSI—which is its sporting sub-committee — "to prepare and propose such measures as are adapted to the situation."

CSI President Prince Paul Alfons Metternich read a statement which underlined in emotional terms the importance of motorsport on a world scale as "a dynamic service of Advanced Study and Research in the Automobile Industry. It motivates a continual progress from which all users benefit directly with reference to both safety, strength and economy."

Metternich and other members of the CSI made it very clear that fuel consumption by racing cars was infinitesimal in terms of global resources, and the CSI is determined that controls on motorsport be determined alongside any proposed restrictions on other sports in view of the fact that most of the fuel used in relation to the sport is that burned by spectators' vehicles.

Swedish CSI delegate Sture Agvald pointed out that a complete ban on all private motoring would save only three per cent of all oil-based energy resources. Huge stockpiles of gasoline would also result since the technology of all European refineries is geared to the production of motor fuels in a proportion which cannot be varied significantly.

In its investigation into eco-

nomy, however, the CSI "considers that Automobile Sport should, public spiritedly, contribute to the economic effort... resulting from the energy crisis." Accordingly, the following measures have been taken:

1. All national sporting authorities are strongly urged to immediately have the consumption of fuel reduced.

2. For 1974, the CSI will co-operate in the economy effort by reducing, by a considerable percentage (the aim being a minimum of 25 per cent), the quantity of fuel necessary for championship events.

3. National sporting authorities are left complete freedom in the planning of their programme of utilisation by closed circuits, and are requested to put these installations at the disposal, in priority, of the industry, for research into both petrol economy and a new fuel.

4. The CSI will immediately convene a group of experts entrusted with the detailed elaboration of his economic policy as well as with the study of different forms of sporting activity and eventually of new types of carburetors adapted to the energy situation."

The Formula 1 constructors are understood to have agreed to a halving of practice sessions, but rulings on the duration of actual races are obviously at the discretion of their organisers. Most seriously affected will be endurance events.

The Daytona 24 Hours has already been postponed to July. Can we now expect the institution of "The 18 hours of Le Mans"? "The 750 kms of Spa"?—happily the Brazilian and Argentine Grands Prix will go ahead as planned, and all members of the industry are optimistic that international events at least will take place.

Speed show postponed

The promoters of the Festival of Speed scheduled for the Alexandra Palace from January 1 to January 6 had to announce last Friday a postponement of the show. Speaking on behalf of the promoters Justin Haler said last Sunday that the current rail and power problems have made it impossible to go ahead with the show. Even though Alexandra Palace has its own generators these are not permitted in the latest Government plans. This meant that there would be no heating or electricity while the rail problem meant that for visitors and exhibitors getting to the show, it would be difficult.

The organisers hope to stage the show in March.

Campbell Trophy to James Hunt

James Hunt has scooped more awards. Last week it was announced that he had been awarded the Campbell Trophy by the RAC and was voted Driver of the Year by the Guild of Motoring Writers.

The Campbell Trophy, which marks the best performance in motor sport by a British driver in a British car, was presented to the RAC by the late Donald Campbell and is awarded annually.

The citation for this year's award reads: "In his first full season of F1 racing, James Hunt, in the Hesketh March consistently showed outstanding ability against established racing stars, coming fourth in the British Grand Prix."



The new Shadow DN3 as tested recently by Peter Revson and Jean-Pierre Jarier. The nose treatment is completely different while the all-enveloping tail has been abandoned for a conventional airbox.

New F1 Shadow...

The latest version of the Formula 1 UOP Shadow is now complete, and has been tested with promising results at Paul Ricard by new UOP signing Peter Revson. The UOP team holds high hopes for the car, and Revson has been quoted in *L'Equipe* as saying that the car will be able to match the JPS and McLaren for competitiveness. "If that doesn't happen, it will be the driver's fault..."

The new car, designated DN3, is in effect a drastically modified version of last year's DN1, which underwent an extensive programme of modifications throughout the 1973 season. Only the basic tub remains of the original car, with completely new bodywork, aerodynamics, front suspension, wheels and gearbox. Shadow designer Tony Southgate has abandoned some of his radical 1973 ideas in favour of a more conventional specification.

Most noticeable are the revised aerodynamics, with "beak" nose reminiscent of Southgate's original BRM P160, containing the oil radiator. The "all-enveloping" tail section of the DN1 has gone in favour of a truncated rear end, and the air box is completely new in an effort to reduce turbulence over the rear wing. Side radiators are retained in their original, side location, but the bodywork is all-new: the airbox incorporates a tidy engine cover.

Front suspension is modified, although similar to last year's. Front uprights are the same as those used by last year's Shadow Can-Am cars, and all-new front wheels have been adopted with a 12-inch inside diameter to cater for the low-profile Goodyear front tyres which have been successfully tested by JPS in the Ricard tests.

● The influx of Grand Prix drivers into the European Touring Car Championship has resulted in some much increased demands for total prize funds of each round of the 1974 series. This became apparent at a meeting of interested parties at the FIA

The DN3 is the first Formula 1 car to be announced with the very latest Hewland FL200 gearbox in place of the earlier FG400. The FL is stated to be stronger than its predecessor (and slightly heavier), with revised lubrication arrangements. Shadow modifications to the box include revised clutch operation and special mounts for the rear wing.

The suspension at the rear of the Shadow went through several stages of modification last year, and the 1974 version is now entirely conventional, with double-link radius rods and parallel lower arms.

... tested by Jarier

Rumours were rife in France last weekend that Jean-Pierre Jarier was about to, or in fact had, signed to drive the second Shadow next year. The Shadow people were reluctant to say anything in Paris at the weekend when they announced their plans but Alan Rees said on Monday that he had "nothing to say. He's contracted to March."

When asked if Shadow had any idea who their second driver might be next year, Rees said: "I think it'll be Follmer."

The cause of the speculation was that Jarier actually drove a Shadow at Paul Ricard last Thursday. Rees said they were coming to the end of their test programme and there was one thing which they wanted to try out and Jarier just happened to be there and did about five laps in the car "which did not entail him going very quickly."

prize-giving last week where Alpina's Burkhard Bovensiepen claimed Grand Prix type money for long distance rounds. A system is being devised for a prize fund system based on the duration of the event but nothing definite will be known for a few weeks yet.

Matchbox in F1

The expected announcement that Matchbox would be sponsoring John Surtees' team in Formula 1 was made in London last Thursday. The Matchbox name will appear on the two cars that Surtees intends to run from the works next year for Carlos Pace and Jochen Mass. Surtees also stressed at the announcement that as far as he was concerned Mike Hailwood was still a contracted driver to the team.

In announcing the Matchbox deal Surtees thanked them for their support in F2 over the past two years (Matchbox-Surtees were first and second in the European championship respectively in '72 and '73).

Mr Leslie Smith, the co-founder and chief executive of Leamy Products who make Matchbox toys said, "We have decided to do Formula 1 because of the immense contribution motor racing sponsorship made to our world wide marketing operation. We won the 1972 European Championship and we were placed second this year. "Matchbox is now ready to capitalise on the additional prestige and promotional potential which F1 racing will give to our plans in 1974."

Surtees went on to say that he still had not lined up his main sponsor. He said that he is in negotiations with some companies but no final decision would be taken until after the two South American Grands Prix when he hoped that the European situation would be more clear.

At the same time as announcing the Matchbox deal the new TS16 pictured exclusively in AUTOSPORT recently, F1 car was officially unveiled. Surtees said about it: "Some people may wonder why we should at this stage be introducing a new model, especially as our TS14 model had only a lifespan of a year. I would emphasise here

that we have not killed off the 14, it will undergo more work when time is available. However the 14 was originally designed at a very early stage to meet the regulations covering safety structures etc (it was the first car to appear with deformable structures at Monza in 1972) and because of this, certain features were designed into the car which subsequently proved to be luxuries. Considering the times which the car did in its initial testing late in '72, it is obvious that for several reasons, some of which were out of our control, it never showed its true potential and this, as most people know, was clearly obvious. Further more the series of problems which plagued us mainly in the way of incidents, through no fault of either our cars or drivers, caused the pressure never to relent and subsequent attention to detail suffered.

"The 14, however, was designed purely as a Formula 1 car. With extremely large sponsors supporting some teams it is vital for their challengers to manage their programmes in such a way that this differential of financial

resources does not make itself too badly felt in the programme. Consequently a decision was made by the Company to develop the 16 rather than carry out a winter development programme with the 14. Certain design features and general trends of thought (but not components) are incorporated in the 16 which have a direct relation to both our F2 and F5000 programme and this rationalisation was considered not only to be an asset to the Company economically but also to the speed with which it could develop its products.

"The car is totally new with no actual components being taken from the existing range of cars although strong similarities do obviously exist in some regions. The concept of the car has borne very much in mind the safety aspect."

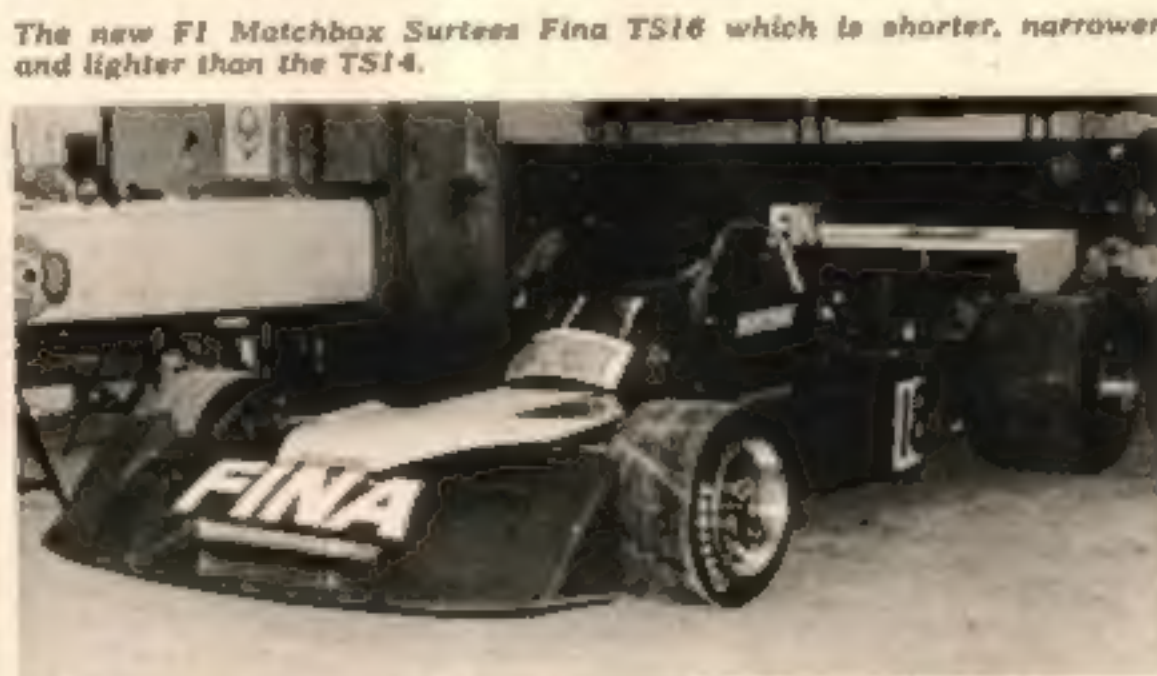
The car, painted blue and white with Fina's name very prominent, has been tested in South Africa with considerable success. The fastest time achieved was 1 m 26.3 s by Carlos Pace on a day considered to be slow. The lap record at Kyalami is 1 m 17.1 s. So far two TS16s have been built and a third car is nearing completion.

Surtees has not yet moved into his purpose built factory at

Edenbridge as he is waiting for the future to be more assured. However he did confirm that he is building five F2 cars and that an F5000 car has been built but not assembled.

As far as F2 was concerned he said that two teams were interested in running his cars but as far as the works were concerned it was not a question of whether they would compete in F2 but just how much. He said a great deal depended on sponsors but he was not prepared to run a sponsored F2 car using the sponsors money just to ball him out because the financial structure of the formula was all wrong. He went on to say that he felt that a European formula was very necessary and that F5000 because it used American engines was not suitable. "We have a situation in F2 where the successful engines come from Germany and this is ideal for what we need. F2 is necessary to develop drivers and we have done this successfully with Mike Hailwood, Jochen Mass and Carlos Pace who have also progressed successfully this way.

● Regarding the situation of Mike Hailwood's contract, Surtees said that Hailwood was still officially contracted to the team. He said that the original intention had been for Rob Walker to run a separate team with Hailwood as the driver, but Walker's sponsorship did not materialise and the plans were dropped. At the time Surtees could not see a way of providing Hailwood with a car and told him to look around for something else as a safeguard and when he had found something, to request a release from his Surtees contract. "He has not requested any release and therefore is still one of my drivers," said Surtees. As far as Rob Walker was concerned, Surtees said that he had said that he still wanted to be involved but since then Surtees had heard nothing.



The new F1 Matchbox Surtees Fina TS16 which is shorter, narrower and lighter than the TS14.

Migault in BRM?

Three Frenchmen in BRMs next year was the strong possibility that emerged from the test sessions at Ricard last week. As well as Jean-Pierre Beltoise and Henri Pescarolo, Francois Migault was also on hand to do a few laps. Migault's F1 experience is very limited—in 1972 he drove the Connex on a few occasions and practised a March 721G at Brands Hatch before badly damaging it.

His emergence as a candidate for a seat will cause much surprise as this season he has done very little racing. He had a few outings in his Ecurie Elan Pymée MDB18 but the car was never competitive while his other activities have been in sports and GT cars, his best result being a second with Milt Minter at Daytona. His most notable single seater achievements were in 1971 when he had a couple of



Francois Migault—F1 ride?

F2 rides. In a LIRA-Lotus at Rouen, his first F2 race, he finished sixth and later in the season he drove a Smog March Racing Division entered March 712 at Aibi and finished fourth.

Except for Beltoise there has been no official word about the make-up of the BRM team next year. Derek Bell has been asked to take in a certain number of GPs and it could be that he and Migault will share the third car with Pescarolo being full time number two.

Shell Clubmen's

The Shell Clubman's Super Sports championship will continue next season for the fifth time. The total championship prize money will be £1,600 and the races will be held at nine different circuits.

There will be 16 rounds in the championship with £100 prize money at each. The best 15 scores will count, with the final round having double points and money. The overall champion will receive £100.

The dates of the rounds are: March 24, Snetterton; March 30, Oulton Park; April 15, Brands Hatch; April 28, Mallory Park; May 12, Snetterton; May 25, Rufforth; June 16, Brands Hatch; July 7, Thruxton; August 5, Mondello Park; August 11, Mallory Park; August 17, Castle Combe; September 8, Silverstone; September 15, Brands Hatch; September 29, Mallory Park; October 13, Brands Hatch; October 27, Mallory Park.

Townsend FF again

The Townsend Thoresen Formula Ford Championship, run exclusively at Brands Hatch, will continue again in 1974 with an 11 race series. It will be called the Townsend Thoresen Formula Ford Challenge and each race will be held at a Clubman's meeting. Points will be allocated on a 9-6-4-3-2-1 basis for the first six places, with all points scored counting towards a driver's championship total and double points being awarded for the last round. The challenge winner will receive £100 and there will be £50 and £25 for the next two places.

Dates for the 1974 rounds are: March 31, April 28, May 5, June 2, June 9, June 16, July 28, August 18, September 8, September 22 and October 6.

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1973 1st, 2nd, 4th BARC Formula Ford Championship
 1st, 2nd German Formula Ford Championship
 2nd, 3rd Austrian Formula Ford Championship
 2nd Dutch Formula Ford Championship
 2nd Canadian Formula Ford Championship

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Castrol Pictorial Quiz results.

Answers:

1. SCA Chevrolet Camaro.
2. Fangio/1954 British GP.
3. Clive Skilton.
4. Per Walldsson.
5. 1973 Welsh/Andy Dawson.
6. Frank Gardner.

The winners:

- J. Goode, Tottenham, London.
 P. Young, Winchester, Hants.
 A. Bodman, Cleve, Bristol.
 I. Brown, Hertford, Herts.
 M. Palin, Paignton, Devon.
 B. Donaldson, Edinburgh.



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AUTOSPORT, DECEMBER 20, 1973

F2 financial changes

Last Wednesday Max Mosley and Peter Gaydon were in Paris to represent the F2 Association who, for the first time, were granted a hearing by the CSI. They met the full CSI sporting sub-committee under the chairmanship of Huschke von Hanstein. The main topics of discussion were the financial arrangements for next year and the situation regarding graded drivers.

The scale of prize money has been revised and is reported to be "more generous." Gaydon said, in fact, that if the organisers paid out the full amount for a 36-car grid the total amount would be in the region of 175,000SwFr, which is 20,000SwFr short of the amount being asked by the Association but an increase on the organisers' original offer. As well as the revised prize money scale the organisers will be paying grid money but this is

"minimal."

Another change is that drivers who run up to a race but either do not qualify or for some reason are unable to start, will be paid 50 per cent of their travelling money (for which there has been no change). As far as the graded drivers are concerned organisers will be allowed to accept more than six entries but as before only six will be allowed to compete and they will be paid starting money only which as before will be fixed by private arrangement. Other graded drivers can start but for non-graded money only which in effect rules them out.

The decisions were all a compromise but Peter Gaydon said that the F2 Association was happy and that he felt that F2 would have a bonanza year in 1974. "The prize money is four times that of F5000 and the cars are cheaper in the first place."

FIA prize-giving

Jackie Stewart received this third World Championship trophy—a specially designed dinner service with gold motif—at the FIA prize-giving in Paris on Saturday.

The recipient of so many trophies, Stewart was still very excited about the award to him of the BBC Sportview "Personality of the Year" Trophy. "It means more to me than all but a handful of my other trophies," he said, "because most of the votes came from ordinary sports fans rather than those who are interested solely in racing. This is remarkable when one considers that motor racing is a minority sport in terms of viewing hours on TV, and I am very hopeful that it is going to lead to an increase in TV motorsports coverage."

Jackie was well aware that motorsports fans made a determined effort to register their votes. "I would like to say a special 'thank you' to all the

AUTOSPORT readers who voted for me," he said, "for taking the trouble to write in on my behalf."

For the time being, Jackie is far from "retired," and he has four secretaries engaged on answering mail—"all of them overworked!"

Other prizewinners in Paris included Jean-Pierre Jarier (European F2 Champion), Chris Craft and Eric Broadley (2-litre Champion Driver and Constructor respectively), Peter Warr representing John Player Special (Champion Car Constructor), Matra-Simca (Championship of Makes) and European Hillclimb Champion Robert Mieusset.

Philip Morris (Europe) were invited to present Jackie Stewart with their "Prix Rouge et Blanc Josef Siffert"—which is not, of course, an FIA award—and their President Ronnie Thompson took the opportunity to congratulate Stewart—a fellow Scot—on his commercial sagacity.

Boxing Day Brands off

The Boxing Day race meeting at Brands Hatch has been cancelled owing to the current fuel crisis situation. Last Friday the RAC Motor Sport Division withdrew the permit for the meeting after consultations with the Department of the Environment.

The RAC have always maintained that they would not stop motor racing until they were faced with Government restrictions forcing them to do so, but they were basing much of their argument on the fact that fuel-consuming generators were still being used for other forms of sport such as football and greyhound stadiums. Since the Government have stopped the use of generators for such purposes in their latest cut-backs the RAC felt with the Department of Environment that it would be very unwise to proceed with this meeting when it was being televised and withdrew its permit last Friday. However, it is understood that John Webb and MCD are very annoyed about the decision after the circuit had spent much time publicising how little fuel would be used at the Brands meeting. Major motor race promoting bodies were scheduled to meet at the RAC yesterday (Wednesday) as a step towards pressing the Government for an agreed programme of at least sufficient motor sport in 1974 to ensure the future of this important industry. It is well known that Great Britain is the world's largest supplier of racing cars and high performance equipment.

Also with regards to the future, the RAC have instigated a special action committee comprising representatives of the RAC, the Society of Motor Manufacturers and Traders, circuit owners and the Association of Competition Car Manufacturers to examine all aspects of the fuel shortage and present a reasoned statistical case to the Government. The findings of the action committee will be presented at a special RAC meeting to be held in the New Year but it will adamantly defend motor sport against discrimination and bring attention to its economical importance in relation to the insignificant quantities of fuel it uses.

A statement issued by RAC Motor Sport's director Dean Delamont last week stated: "We urgently need a detailed analysis of the amounts of fuel consumed in all types of motoring events so that any decisions which have to be taken will be based on as wide a range of information as possible. The results of the study will also aid the RAC in presenting a case for the continuation of motor sport to the Government and for a reasonable allocation of fuel in the event of rationing."

New Clubmen's Gryphon

Andy Diamond this week announced the latest Gryphon Clubman's Super Sports car, the C4A. It is different in concept from his previous models in that a great deal of attention has been paid to reducing the amount of drag which these front engined cars are rather prone to producing.

As with other previous Gryphons it has independent suspension all round and next year's car has a completely revised front end. The car also features many new aerodynamic features which have proved to be very successful in recent testing.

Gryphon Cars will again be entering a works car next year

for Noel Stanbury which will contest all the Shell championship rounds and other selected events. The works C4A will use one of the new downdraught engines from John Dunn's Swindon Racing Engines concern.

Production of the new cars is well underway at Gryphon's new factory in St Ives, Hunts and it will of course be available in 'B' specification for the new FF engined class.

● AUTOSPORT will be published as usual next week. Contents include an interview with the RAC's Dean Delamont as well as normal features.

CATCHPOLE

By Barry Foley



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Alternative fuels for racing cars

At the moment of writing this article, the public are not having to suffer actual petrol rationing, though tickets have been issued and the danger is ever-present. In fact, however, shortage at the pumps is greatly curtailing private motoring and the queuing habits of wartime are reasserting themselves. Many people will cancel trips to visit their families at Christmas for fear of being stranded without fuel, while much worry and loss may be occasioned by failures to keep business appointments.

Under these circumstances, the public will let out a roar of protest if they catch us having fun with cars. Though neither the government nor the RAC have acted as this leaves my pen, the withdrawal of petrol for racing is expected hourly. After the war, when rationing was still in force, a sprint was run at Luton Hoo for racing cars only, as these machines all ran on alcohol fuel, which was beyond the law. As petrol was only issued for business purposes, no spectators could drive to a sporting event, but a car auction was organised at the same venue, so the many people who were questioned by the police simply gave this as the reason for their essential journey. I hired a lorry to carry my racing car and took a lot of friends along, too.

As private motoring over moderate distances is unlikely to be banned, at least for the present, most of the really keen spectators will be able to attend. It is merely necessary to advertise that there will not be a drop of petrol used in any of the racing cars. Many people who have come into racing since the "dope" fuel days are under the erroneous impression that far-reaching changes, such as the adoption of astronomical compression ratios, would be necessary for the use of alcohol fuels. While this might be the case if the ultimate power were to be extracted from it, the purpose of this article is to show that any existing racing car could be made to run very well on alcohol.

The proof that high-compression engines are not necessary was provided in 1902. This was in the days of the great town-to-town races and some left-wing French politicians claimed that motor racing was a class sport, of no benefit to the masses. As there was a general election coming up, the government hurriedly banned the use of roads for racing. Luckily, the Minister of Agriculture was evidently a racing enthusiast and he was at that time trying to popularise alcohol, a product of the depressed agricultural industry, as a fuel. He was able to insist that a great race be run, exclusively on alcohol, as a demonstration, and thus the ban was circumvented.

The race was the Circuit du Nord and Charles Jarrott, who finished second in a Panhard, is worth quoting. "I found that an alteration was necessary to the carburettor, but beyond this the change of fuel made no difference in the running of the car, with the exception that the fumes emitted from the exhaust were acrid and exceedingly nauseous." As his 40 hp Panhard probably had a compression ratio not much higher than 3 to 1, nobody need worry unduly about special high-compression pistons.

There are two forms of alcohol which may be used as fuel. These are ethyl alcohol (C_2H_5O) and methyl alcohol (CH_3O).

Ethyl alcohol is generally made from cereal and potato starches, fermented with molasses or sugar and then distilled. Methyl alcohol, called methanol commercially, results from the destructive distillation of wood. In some countries, notably behind the Iron curtain, it is compulsory to blend some alcohol with normal fuels in order to consume agricultural over-production or damaged products and left-overs. In this country, wood is scarce and expensive while much of it is being used to combat the desperate paper shortage, but enough should be found to satisfy the com-

paratively small requirements of motor racing.

Ethyl alcohol has a boiling point of 78.3 deg C and a specific gravity of 0.806, compared with 65 deg C and 0.800 for methanol. The air/fuel ratios by weight are 8.95 and 8.44 to 1, compared with about 15 to 1 for petrol, so the fuel consumption if alcohol were used neat would be approximately doubled. As petrol has a much higher calorific value, the amount of power produced would be about the same, were it not for two very great advantages of alcohol. Alcohol has about three times the latent heat of evaporation of petrol and this cooling effect greatly increases the volumetric efficiency of an engine. It also permits the use of an extremely high compression ratio—higher than could readily be achieved with a short-stroke engine.

It was the qualities of internal cooling and resistance to detonation that made alcohol fuels essential when racing engines were supercharged. For unsupercharged engines, however, a straight alcohol fuel is too "good" and it cannot be fully exploited. Though excellent horsepower figures would be achieved on the bench, the fuel consumption would be needlessly high. There is also the problem of getting a clean pickup. Alcohol, being a single chemical compound, has a narrow boiling range and gives bad cold starting. This can be overcome in a racing engine by squirting something more volatile into the intakes, but it is no answer to the dilemma of getting the engine to fire again after the driver has lifted his foot.

When the car slows for a corner, the fire goes out, and the cooling effect of the alcohol prevents it from being re-lighted. Various additives, such as acetone and nitrobenzene, can prevent this condition, but there is a much better alternative. For unsupercharged engines, a 50/50 mixture of alcohol and benzole may be used with great advantage. The problem of getting a clean pickup disappears and the enormous fuel consumption of straight alcohol is greatly reduced.

It's all a question of whether or not benzole will be available and regarded as a permitted fuel. It is not imported, so it has no connection with the present crisis, but is a by-product of the distillation of coal. It used to be in plentiful supply because a great deal of coal was distilled for industrial purposes, but now that less is used, benzole production has gone down. Only 3 gallons comes from every ton of coal distilled, by the time it has been cleaned and purified.

Benzole may be mixed with alcohol without any precautions, whereas petrol and alcohol form an unstable blend. Particularly if any water is present, the petrol will separate out in the tank, which means that sometimes you are running on neat petrol and some of the time on straight alcohol. As the air/fuel mixture cannot be right for both the engine will run extremely badly or stop.

On the other hand, benzole contains benzene, which dissolves in alcohol and is slightly soluble in water plus small quantities of toluene and xylene. Once alcohol and benzole are mixed in a pre-determined ratio, they stay that way while the propensity of alcohol for taking up water is of no consequence. Indeed, water may be deliberately mixed in as a cooling agent and I have done this myself to prevent deterioration in an engine prone to piston failure. If some benzole

has already been mixed with the alcohol, a small amount of petrol may also be added and will not separate out under normal conditions.

Benzole has a specific gravity of 0.875 to 0.882 compared with something like 0.740 for the average petrol or 0.680 for the most volatile spirit. Rolls-Royce used to supply heavier carburettor floats for those owners who used benzole, but I never found this necessary and the same jetting as for petrol sufficed.

Fuel mixtures consisting largely of alcohol were employed for supercharged racing cars and a benzole-alcohol mixture was favoured for unblown machines. Luckily, it was after superchargers were banned that the oil companies insisted on the use of straight petrol, but as theirs was by far the greatest financial contribution in those days, they were entitled to do so. Now that other sponsors have taken over the main burden, they can no longer enforce the use of their own products. The builders of the cars are against alcohol fuel, because the heavy consumption would mean the return of pit stops to grand prix racing, but if it's a case of either alcohol or no racing, surely they would relent.

There is no doubt that many people would be glad to see alcohol fuels revived, because of the much reduced fire risk in the event of an accident. Whether or not certain additives would nullify this fire protection I am not qualified to say, but I presume that the addition of a large quantity of benzole would increase the danger to some extent.

Apart from getting the fuel/air mixture right, it might be necessary to increase the capacity of the fuel pump. It is usual to double up on fuel pipe size when dope is consumed and it may be necessary to increase the venting of the tank. Where carburettors are used, float-chambers are nearly always a problem, twin floats being employed on occasion, though it's best to evolve a floatless system if possible.

Some people may think that I am exaggerating when I say that straight alcohol, or a fuel mixture consisting largely of it, will be used up at twice the rate of petrol. I have already given the air/fuel ratios and the situation is even worse than it would appear, for whereas there is a power loss if petrol is used in a mixture more than 15 per cent rich, the power goes on increasing with alcohol until it is 40 per cent richer than the normal economical setting. Furthermore, the increased volumetric efficiency, brought about by the high latent heat of evaporation of the fuel, must increase the power output and burn more fuel in doing it. To put it another way, the calorific value of methanol would be around 11,400 BThUs per lb, compared with over 20,000 for petrol, so you need about twice as much of it.

Fundamentally, therefore, grand prix cars would have to make one stop per race at least, and probably two if the full power possibilities of the fuel were extracted. The internal cooling of the fuel and the complete elimination of any incipient detonation would certainly increase the life and improve the reliability of engines. Of course it is likely that any races held during the present crisis will be short ones, but the petrol shortage may be with us for years and so alcohol could again become the normal racing fuel.

There are two serious comments that I must make and the first is about using methanol in a road car. You would need enormous jets before the thing would go at all and some types of flexible pipe or carburettor joint would quickly be destroyed by the action of the fuel. Any splashes round the filler cap would spoil the paintwork and in fact I sometimes use old racing dope as a paint remover. As the fuel tax has not been paid on the stuff, you would be liable to a heavy fine and the smell would give you away.

The second point concerns using methanol to pop up the drinks at a party. You will probably go blind before you die in awful agony, so NEVER, NEVER DRINK IT!

JOHN BOLSTER



Victorious team (left to right) Ken Tyrrell, Larry Truesdale, Jackie Stewart and Ed Alexander after Stewart had won the World Championship

Goodyear's man at the helm

MIKE DOODSON interviews ED ALEXANDER

Goodyear tyres dominated Formula 1 racing during 1973 in a style that has not been seen since Dunlop had a monopoly in the early sixties. But in Goodyear's case each victory had to be fought for against a determined and often aggressive competitor, and for every victory there were at least 200 people at Goodyear's Wolverhampton factory who had the satisfaction of being involved with the victorious tyres. Guiding their efforts for the past two seasons has been a burly 35-year-old American, Ed Alexander, who is Goodyear's International Racing Manager.

A racing tyre man has a tough furrow to plough. He must have the practical qualities of technical knowledge and able administration, and combine them with a political *savoir-faire* to rival that of a UN officer in the Sinai. His favours are curried when his product is winning, but he is the first to be blamed when they are not. Progress demands that he expend maximum effort on staying competitive, yet often he is the whipping-boy of drivers who have just "unaccountably" shunted or circuit owners trying to apportion blame for severe accidents.

Ed Alexander was in at the beginning of Goodyear's racing effort when the company started—like its customers in Detroit—to chase the "youth market" that began to dominate the automotive market place in 1963. The company hit the headlines when it announced that it would participate at Indianapolis in 1963, but not one driver chose to run Goodyear products in that year's race.

"I guess I put on five years in that one day," admits Alexander, but he survived to head Goodyear's GT racing programme when Ford went to Le Mans in 1966 and 1967, and he designed the tyre that won Goodyear's first Indy 500 in 1967. The technician who finalised the compound of that tyre was Leo Mehl, Alexander's predecessor at Wolverhampton, and a man whose quiet assurance won friends and prestige for Goodyear across Europe.

Leo Mehl now oversees radial tyre development for Goodyear at Akron, tyre "capital" of the USA, and Alexander—an able diplomat for his company—knows that he will follow the path back to "civilian" life. "Goodyear management has looked upon racing as an excellent training ground for personnel, and there's a big alumni now considering the short time we've been in racing. Many of the guys who have worked in racing have gone on to major posts within the company, and I would consider that my spell at Wolverhampton is going to be my last in racing."

Although Goodyear shares Grand Prix grids

on a more-or-less 50/50 basis with Firestone a Goodyear contract is something which is greatly sought-after by many teams, as much for the valuable bonuses which accrue from success as for the efficient test sessions in which Goodyear-contracted teams participate at the company's expense.

With all three of the "First Division" Formula 1 teams on its books this year (and next), Goodyear was sitting pretty at the beginning of the season. "I think our products improved vastly by having all three of them competing not only in racing but also in testing," says Alexander. "Having that sort of talent forces the ultimate out of your product. But everybody in this business wants to win, and you never know when another winning team is going to crop up." Perhaps Hesketh Racing will supply the opposition in 1974.

Another reason for Goodyear's monopoly of the top teams is the company's stated intention to stay in racing for several years at a time. "Racing is an industry with a business approach now, and it's been plussed-out in the automotive world as Good for Reputation, Good for Contacts and Good as a Sales Tool." Such remarks must be encouraging for a sport which is trying hard to justify its continued existence as a consumer of scarce raw commodities.

Production at Wolverhampton continues to expand enormously, and there have been various important changes in recent years. Rally tyre manufacture and development has been moved to Goodyear's European HQ at Luxembourg, and the factory expanded to make more and more racing tyres. Although tyres are "built" on expensive US-made machines, the work is up to craftsman standard, with the operative's skills all-important. The combination of talents in the textiles, chemistry and composition of a racing tyre must rival those behind a Formula 1 car.

Alexander is reluctant to reveal production figures ("any number I gave you today would likely be obsolete tomorrow") but he's under

pressure to get things moving even faster. "I can assure you that the reason for the expansion is primarily tyres for sale through our national tyre dealers in Europe. They look to Wolverhampton for race tyres, and for the past two years all they've been getting from us has been promises. Now we are in a position to deliver this punch, and I just hope that it doesn't get affected by the energy crisis."

Already the crisis has taken its toll. "We just finished production for the Daytona 24 hours, and today I heard that Daytona is postponed. 'Postponed' is a nice word for 'cancelled' because there just isn't a place for it in the calendar after February. I've never had my tyres manufactured this early before and now there are several hundred which will have to 'die'... it's a tough world to be in, and right now it hurts."

"Rather than be pessimistic, though, I would like to think that a lot of over-reaction has taken place in the past month or so, and that really the stabilisation factor in the world is beginning to show. There are going to be statements shortly from the CSI that indicate we will be motor racing in 1974."

Tyre manufacturers have come under fire from within racing as well as from outside and there's a lobby which insists that punctures are putting drivers' lives at risk, quite apart from ruining good races by forcing front-runners into the pits for tyre changes. The blame inevitably is laid on the manufacturers of the so-called "faulty" or "fragile" tyres.

I asked whether there was any evidence to support allegations that punctures are more prevalent now than they were 2-3 years ago. "Everybody in racing has raised his standards, and that includes the tyre companies," replied Alexander. "Organisers, constructors and sanctioning bodies, and in raising our standards we are noticing things more. Ten years ago, all punctures were high-impact punctures which resulted in dramatic spins or flips, and they were the result of high pressures."

"But the modern racing tyre is of 30-40 per cent aspect ratio with ultra-low pressures in the chambers, and as a result of this, when punctures take place the driver is able to return to the pits with his car—they are intact. Our tyres have the proven ability to run with no inflation pressure—I'm talking about zero pressure—and still run a flat-out fast lap like Emerson Fittipaldi did to win the Spanish Grand Prix this year. All our teams have told me that they have not been able to pin the cause of an accident to a puncture with a modern low-profile racing tyre."

The Formula 1 Constructors have been vocal throughout the year for more positive steps to



Latest Goodyear F1 tyre seen at Ricard last week

be taken about keeping race tracks clean and free from the sort of hazards which result in tyre deflations. Some race tracks continue to sell beer and soft drinks in bottles from paddock bars where thoughtlessness can be guaranteed to put broken glass under the wheels of the racing cars, but Alexander cannot accept responsibility for such hazards.

"We've never apologised for a tyre being punctured. When all's said and done, tyres are made out of string and rubber, and when you have to run over sharp objects—whether it's a piece of glass or bits of broken engine—there's no way to avoid a puncture. We are aware of areas that need to be cleaned up outside of the tyres, and I would mention that track conditions have not been disciplined with a suitable inspection programme.

"We recommend that 15 minutes prior to every practice session there should be a group of tyre technicians from both companies together with stewards from the circuit, to inspect the track. This doesn't happen every where, with the result quite often that after 15 or 20 minutes of practice the drivers come in to tell me that the track is covered in debris, and we also have punctures here and there. Eventually we find that the tyres have swept the track clean, but race tyres were never designed or built to clean race tracks.

"It's a problem which I expect will be overcome, and I have already written to the CSI on the subject. There's also the question of

small sharp stones and volcanic ash which gets on to track surfaces, penetrating the soft rubber and the carcass of a tyre, giving rise to slow punctures. There's been a lot of motivated work going on in this area over the past six months, and I would expect that in 1974 you'll see demonstrations from tyre manufacturers that this sort of problem can be overcome.

The most accusing finger of all has been pointed at tyre companies by the Association of Circuit Owners, who issued a statement at Monza this year to the effect that the tyre companies had contributed wilfully to the dangers of motor racing by increasing cornering speeds to unrealistic levels.

Goodyear, which bills itself as "the safety minded company," has already reacted. "The constructors and us have approached this subject of cornering speeds, which has been brought up by the circuit owners as their excuse mechanism, and we've approached it analytically. In a test conducted a month ago, we ran a Formula 1 car around a circuit with a 35 per cent reduction in wing area and a 45 per cent reduction in engine power. Around a corner where cornering speed is normally 185 mph, we reduced the speed by 3 mph, which is a little over 1 per cent.

"We have concluded that it is impossible to reduce cornering speeds by the methods that the circuit owners have suggested—such as wing reduction, power reduction or a

reduction in tyre width—without getting very nasty results. Such vehicles are ill-handling and close to uncontrollable, capable of velocities which are high enough to be spectacular and sensational, but which reduce safety by a tremendous amount.

We have spent money in this area, and can discuss it intelligently. We don't know how we can reduce cornering speeds via race cars or race tyres without causing an unsafe situation, but in spite of our technical and analytical approach the circuit owners think we're throwing the ball back in their court."

Max Mosley has proposed that the situation be circumvented by altering circuits rather than cars. Alexander does not accept that there is a problem. "People are now ready to recognise that a Formula 2 car is actually quicker round Woodcote corner, for example, than a Formula 1 car, and that a Formula 3 goes darn near as quick. This sort of data is going to show that if you change the vehicles through its tyres, wings and weight, then you're merely going to move the problem from one corner to another.

There are more practical fields to be tidied up. In Formula 1, for example, there is not a team that doesn't use safety bolts or safety ledges on its wheels. Yet in other forms of racing such as F2 there are many people who don't use safety bolts. When a tyre deflates, for whatever reason, a crash is possible which otherwise could have been prevented by safety legislation."

Perhaps because tyre men are practical men, when flak is aimed at them and it explodes wide of the mark they ignore it. But they don't get credit for finding the answers to the problems of the past. For example, do you remember the terrible effects of tyre "vibrations" back in 1971? Although some drivers say that they like vibrations "because then they know they're on the limit," the companies have a much greater understanding of the situation.

We think we know what induces vibrations, and there are seven or eight physical parameters in our product that we can work with to control this in the unloaded tyre. In the past two years, our reputation has been put to the test, but to say that it won't come back or crop up again would be foolish."

Tyre men work incredibly fast, often without it being realised. Goodyear got a bit of a shock at Buenos Aires this year when Regazzoni put his BRM on the pole and looked like walking off with the race until the heat of the day and hard driving warmed his Firestones to melting point. Not every race would be as hot, figured some... perhaps Firestone would be the right choice for '73.

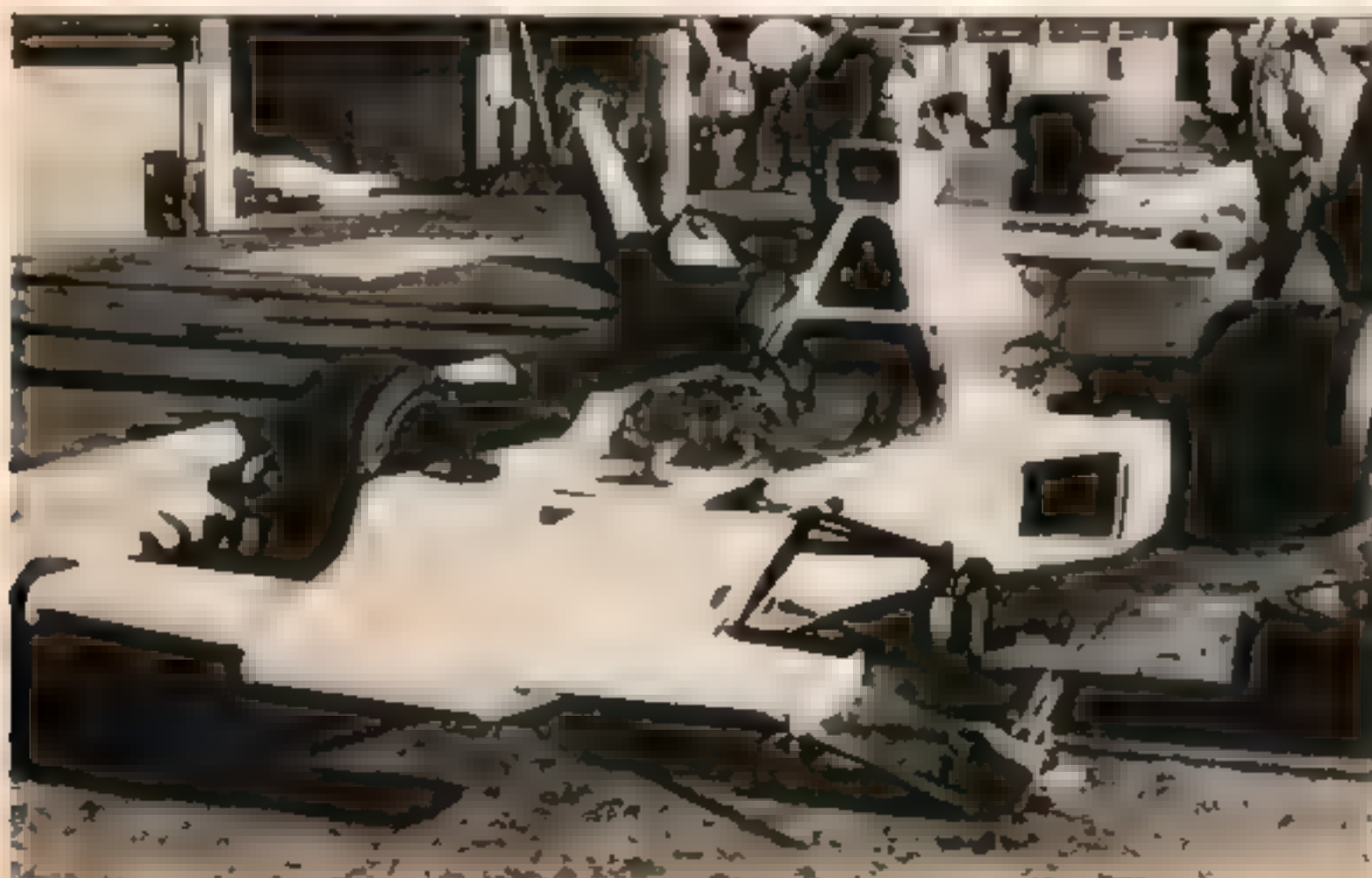
Alexander and his Goodyear men were quickly in action. That was a crisis situation which demanded prompt action. "We had some good meetings in the Sheraton Hotel on the Monday with Colin Chapman and Peter Warr to discuss improvements for Brazil. The information was passed back to Wolverhampton, and we had a completely different construction and a different size rear tyre ready for Brazil, 10 days later, even though that hadn't been our intention when we went to South America.

"That presented us with a challenge from the points of view of both manufacture and delivery, because we were working thousands of miles away from the tracks. You can't be late in Grand Prix racing... there's no turning up at the track on Monday morning and saying 'Phew, we just made it,' because the race was on Sunday."

Perhaps Goodyear has been caught out in the matter of rain tyres. Jackie Stewart was lapped three times by Firestone men Rodriguez and Ickx in the wet Dutch GP of 1971, and some observers base their assessment of Goodyear's wet road rubber on that one race.

But recent tests have shown that the leeway may well have been caught up. "These things have trends and cycles, and I expect to see the trend come back. We've been testing a new wet weather product recently, and the reports are enthusiastic. Jackie Stewart has told me that he'll come out of retirement if I can guarantee him that every Grand Prix next year is held in the wet.

A McLaren M23 at the Ricard pits during Goodyear tyre testing recently



Where are the British graded drivers?

For once the FIA have been quick in publishing the lists of Graded Drivers for next season, whereas normally we have had to wait for the Yellow Book for the official lists. What is more, the FIA seem to have got the lists right, or almost right, for I claim that de Adamich ought to be added to the Grand Prix group and Jost to the Long Distance list, and I'm pretty sure that I am right.

A rather depressing point, however, is the scarcity of British drivers in the lists for 1974. There is not a single British name among the Long Distance drivers and there are only four in the Grand Prix batch, namely Mike Hailwood, Graham Hill, James Hunt and Jackie Stewart, and of these the latter has already proclaimed his retirement. As most people know, "grading" continues for two seasons following the performance that achieves it, and Hailwood and Hill both failed to score any sort of Grand Prix successes in 1973, but remain graded for 1974 by virtue of their efforts in 1972. Hunt, on the other hand, qualified very notably during 1973 and so is certain of being a graded Grand Prix driver for both 1974 and 1975, which is a somewhat notable achievement for a young driver in his very first season of Formula 1 work and a very great tribute to the Hesketh organisation.

ROLAND KING-FARLOW
HIGHGATE, LONDON, N6.

Road rally nuisance

Members of Teify Valley MC who organise one Castrol/MN (Cilwenderg) rally and one Welsh championship event each year, are disturbed (to put it mildly) that the staff of AUTOSPORT have adopted the "animal farm" philosophy that all motor sports are equal but some motor sports are more equal than others.

What statistics have you used to prove that "the increasing number of complaints are all stemming from road rallying?" You could, for instance, have consulted the Dyfed Constabulary in the heart of Wales whose files do not contain a single complaint from the general public after either of our two major road rallies. On the other hand, it is not unusual for complaints to follow the road sections of stage events, so before making a blanket statement of that kind it would have been just as well to find out which complaints are now being "automatically lumped" against "rallying in general."

As for the caption to the yumping Escort, this implies that a road rally bursts on the rural scene like a surprise attack from outer space. As the Cilwenderg PR campaign, for instance, involves visiting 2,000 or so households, farmers with fields along the route, and various authorities, at least 6,000 non-objecting individuals will know beforehand when and where the rally is to be run. This, of course, is the "improved pre-event publicity" which inevitably results in "hordes of spectators"—the general public in other words and you seem unable to grasp the fact that they are enjoying themselves too!

The "general public" is the least of the worries that besets the 70 member clubs of the Welsh Association, all of whom are greatly concerned with the continuance of road rallying and its public acceptance. Our greatest dismay at the moment is the apparent intention of the RAC Motorsport's Division to phase out road rallying and ditching thousands of club enthusiasts who find it the only form of rallying they can afford. Whatever the administrative tangles that are driving the RAC to exterminate a large section of its fee-paying membership, to find out "motor sporting weekly" joining in the hunt is incomprehensible.

As for the meaningless blurb about stage rallies being "more meaningful" etc—perhaps

the staff of AUTOSPORT should come on location some time and form a second opinion on their diagnosis that the "RAC is alive!"
LLANDYSUL, CARDS. MEGAN LEWIS
(On behalf of Teify Valley MC)

Not over, the Hill!

Having followed motor sport for the past few years, I was finally prompted to write, having watched the "interview" between Graham Hill and Jackie Stewart on Sports Personality of the Year (which, as if everyone did not know, JYS won). During the interview, JYS and later Mary Peters, dropped some very heavy hints to Graham Hill on the subject of his retirement. If, as I believe he should, he was to retire from driving after a long and distinguished one as a driver, he could serve the sport by, and hopefully get pleasure from, the following two methods.

1. By continuing to run the Embassy Lola team as a two car outfit (if funds go that far) with perhaps Chris Amon or a similar standard of driver as lead driver and the second seat given to a local up and coming driver at every Grand Prix, which could very well draw a bigger crowd than would otherwise be expected.

2. By continuing to promote, perhaps with JYS, motor racing at all levels particularly at this moment when motor racing is in danger because of the fuel crisis.

KENNETH KEAR.

PORTLAND ROAD
LONDON, W11

Yellow lines for a safe passage

There has been much discussion in the past with reference drivers overtaking under a yellow flag due to some mishap on the track. I think (and I believe someone else has written on a similar basis) that the problem could be solved by the simple method of painting a yellow line down the outside of the track say about eight feet from the edge of the track. Should an accident occur and the yellow flags come out, all the cars must keep in the lane formed by the line and the outside of the track until the incident is passed whereupon a green flag be shown and the racing begun again. The cars should have plenty of time to get into the lane as a stationary yellow flag should be shown by at least one marshal post before the incident. Should the accident occur in the lane, the cars can be directed quite easily from the lane, around the incident and back into the race again.

But perhaps the greatest benefit from having such a lane is in the unfortunate case when there has been a major accident which necessitates ambulances and rescue vehicles being despatched on to the circuit. In such a situation, where the white flag is shown all around the circuit, all the competing cars must keep to the lane which will leave the rest of the track free for the rescue units to get to the accident. The units would then be able to drive against the flow of the race traffic to get to the scene of the accident quicker (I am thinking here of the terrible Zandvoort tragedy). Again, should the accident occur in the lane, it would be quite a simple matter for the marshals to direct the race traffic out of the lane, around the crash and back into the lane again. Once the accident has been cleared, the race could be started by the green flag being shown when the leader (if a white flag is shown, it normally means that there has been a big accident which in turn means that there should be time enough to decide the correct leader) passes way the start/finish line. Once the green flag has been shown at the start/finish line, the other marshals at their posts seeing the green flag can withdraw their white flags and show the green. Thus the whole circuit could be under race conditions within a very

short space of time with perhaps the leader receiving a slight advantage.

Using a system like this would mean that a pace car would not have to be used. This would cut out all the controversy over using a pace car (Canadian Grand Prix!) i.e. the safety point of view and the cost of running such a car. The race cars can find their own speed whilst in the lane and would not be hindered by the imposed speed of the pace car.

Should the leading car go into the pits for some reason or other, then the car lying in second place would inherit the lead. This, I feel, will be a step in stopping any car (not just the leading car) from taking a so-called advantage by going into the pits for, for instance a tyre change.

I think that this system of creating a lane could be used more effectively on most circuits though perhaps on the long circuits like the Nurburgring, it would not be so practical.

With regard to cost, the cost of painting a yellow line would be negligible to the cost of running a pace car, so there should be no argument here and the saving of life and serious burning by having free access for rescue vehicles to the accident could be greatly increased, so I think that this idea is a perfectly viable one in all respects.
CROYDON, SURREY. R. S. BROWNE

Clearing the air!

Mr Robin Richards has once again accelerated the decline of his reputation, and cast more doubt on his credibility as a competent broadcaster and motor sport commentator (AUTOSPORT, December 8 Correspondence).

I am a disc-jockey, not a news reporter, I am a motoring "enthusiast," not an "expert," and bearing that in mind, every morning at approximately 6.40 am I inject into my breakfast show a motoring orientated comment. My programme features more music than any other two-hour daytime show in Great Britain, and every speech-link is precious.

At one stage there was outside pressure to drop the motoring spot, but the tremendous mail I receive and encouraging comments in motoring publications helped me to resist the axe. Why is this 60-120 second segment so precious to me? Because it allows me to convey to between five million and 10 million people the excitement, the heartbreak, the splendour, and the magic, and most important of all, the very purpose of motor sport.

When Mr Richards was "told" about my criticism of the national Press, was he also told that on the Monday of the RAC rally, I extensively trailed his afternoon reports on Radio Two? Did it ever occur to him that his reporting style is 10 to 20 years out of date, and that was one reason why his services were not required on Radio One? Mr Richards should stop blowing his own trumpet and start caring a little more about the orchestra.

NOEL EDMONDS.

LONDON, NW11

Vindictive?

I doubt very much whether this letter will be printed in your columns, but I feel I must air my views not only to you but your readers. It concerns your reporter Robin Rew and his singularly vindictive reports aimed at Malcolm Allen in his reports of the Silverstone Sprint Championship. If Mr Rew cared to look a little further around the competitors he might see a Mini Clubman 1275 GT with a 999 "S" engine! A 2.5 Pi Vitesse, road race Ginetta to name but a few.

Surely AUTOSPORT should ensure that Mr Rew reports unbiased facts, not his personal opinions. I think we all know by now Mr Rew favours the Single Seater brigade in his reports!

WARWICKS.

JOHN ARTHURS.



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The Moss Lotus is already well off the track, bouncing over the grass towards the bank of St Marys. There is no sign of chassis or suspension damage, no visible signs of engine failure, and Moss is upright in the cockpit. Below, a portrait of Moss in the cockpit taken seconds before the start of the Goodwood Glover trophy race

The Great Moss mystery: Why did he crash?

By EOIN YOUNG Photographs by MICHAEL COOPER

His era ended when Stirling Moss crashed at Goodwood on Easter Monday, 1962, suffering injuries that were to force his retirement from racing. What caused his crash? It's odd that the accidents which claim top drivers are seldom explainable. What caused Jimmy Clark's crash at Hockenheim? Why did Jo Siffert crash at Brands Hatch? Why did François Cevert crash at Watkins Glen? When there is no instant and obvious explanation, imagination takes over and driver error is usually assumed, not even the best being infallible.

An odd aspect of the Moss crash is that a racing photographer, Michael Cooper had dreamed about it a week earlier. Dreams can be tailored to suit events like this—after they have happened—but Cooper told his then girlfriend about the dream and said he thought Moss was about to have a fatal crash. Dreams are also regarded as somewhat suspect, as are dreamers, and he was probably too embarrassed to mention the dream to anyone in racing.

"In the dream Moss left the track at St Marys, crossed a wide area of grass, and slammed into the bank with a muffled thundering CRUMP which threw the driver out of the cockpit and he just seemed to keep on going up," Cooper recalls. "I could only presume that this meant he had died. But it was hardly the sort of story I could go and tell Stirling."

That sort of description is fairly typical of prediction dreams remembered conveniently after a newsmaking incident, but the odd fact is that Cooper had identified the corner at Goodwood and it was a corner he had never previously worked at. He had only recently started to photograph motor racing for magazines and he had tended to frequent the corners where action was likely to occur: Fordwater and the kinked run down to St Marys was a dull section by comparison with Woodcote and the chicane. It was also on the far side of the track and a long walk for lazy photographers.

On the day of the race Cooper had trouble with his car on the way to the track and in trying to cover the event and also arrange for a ride back to London he completely forgot about his dream. But for some odd reason

every shot he took of the Glover Trophy race featured Moss, although again this could be explained by the fact that Stirling was then the superstar and was starting from his customary pole position.

Cooper shot his quota of photographs of the field lined up on the grid and then started to make his way across the infield to the featureless area of St Marys, for no good reason that he was able to recall. He waited for lap after lap on the inside of the track with his 180mm Mamiyaflex, a heavy twin lens reflex camera hardly ideal for the long shot fast action photographs he was shooting.

Moss led the race initially but then he started to have trouble finding gears in the Colotti box and Graham Hill swept into the lead in the new 1.4-litre BRM V8. Moss lost three laps while the LDT mechanics battled to free the sticking transmission and when he went back into the race he was three laps down. In those days Moss was the professional, the Jackie Stewart stylemaster of his day if you care to twist history, and it was not in his makeup to throw in the towel.

Instead he went record smashing in what was only his third race with the Coventry Climax V8 engine in Rob Walker's special Lotus which had been built up the year before using a Type 18 chassis with suspension modifications from the Type 21. When the Coventry Climax V8 was made available, the Cooper team received the first one, and the Walker team received the second. They had originally updated a pair of Lotus 18 chassis, so they sent the unused spare to Harry Ferguson Research to have the rear part of the chassis chopped off and replaced with a frame that would take the broader V8



Lotus 21 rear suspension was fitted, with Hardy Spicer sliding spine driveshafts mated to a Colotti Type 32 gearbox. Moss used the car briefly at Monza during practice for the 1961 Grand Prix but thankfully accepted Innes Ireland's offer of his works Lotus 21 for the race.

His first race with the Lotus V8 had been in the non-title Brussels Grand Prix but a variety of mishaps in the three-heat race ended with the valve gear failure and his retirement. At Snetterton the weekend before Easter, the LDT Laystall team borrowed the car from Rob Walker and repainted it in their apple-green colours for Stirling to drive. Moss started from pole position leading from Hill's BRM V8 but Jimmy Clark came from behind in the new Lotus 24 V8 and took the lead when Stirling's throttle started sticking and he headed for the pits. It was to take three pit stops to cure the sticking throttle, but he came back in flying form to set fastest lap and equal Innes Ireland's record set the year before with the 2.4-litre works Lotus.

Moss went back into the race at Goodwood three laps down on Graham Hill who was driving the stick-pipe BRM in the manner that was to win him four GPs and the World Championship that year. There was nothing to gain but everything to lose as Moss set out to repeat his Snetterton performance and



Split seconds after impact the nose of the Lotus is crumpled against the bank and a carnage scene from the wreckage

snatch the lap record. This time the job was harder because John Surtees was engaged in a similar task with a brand new Lotus fitted with a Climax V8 engine for the first time.

Moss had stopped on the ninth lap and Hill had completed his 12th when Stirling went out on to the track again. Moss' best lap in the lead had been 1 m 23 s but Surtees was roused after a spin in the new Lotus and replied with 1 m 22.6 s before the

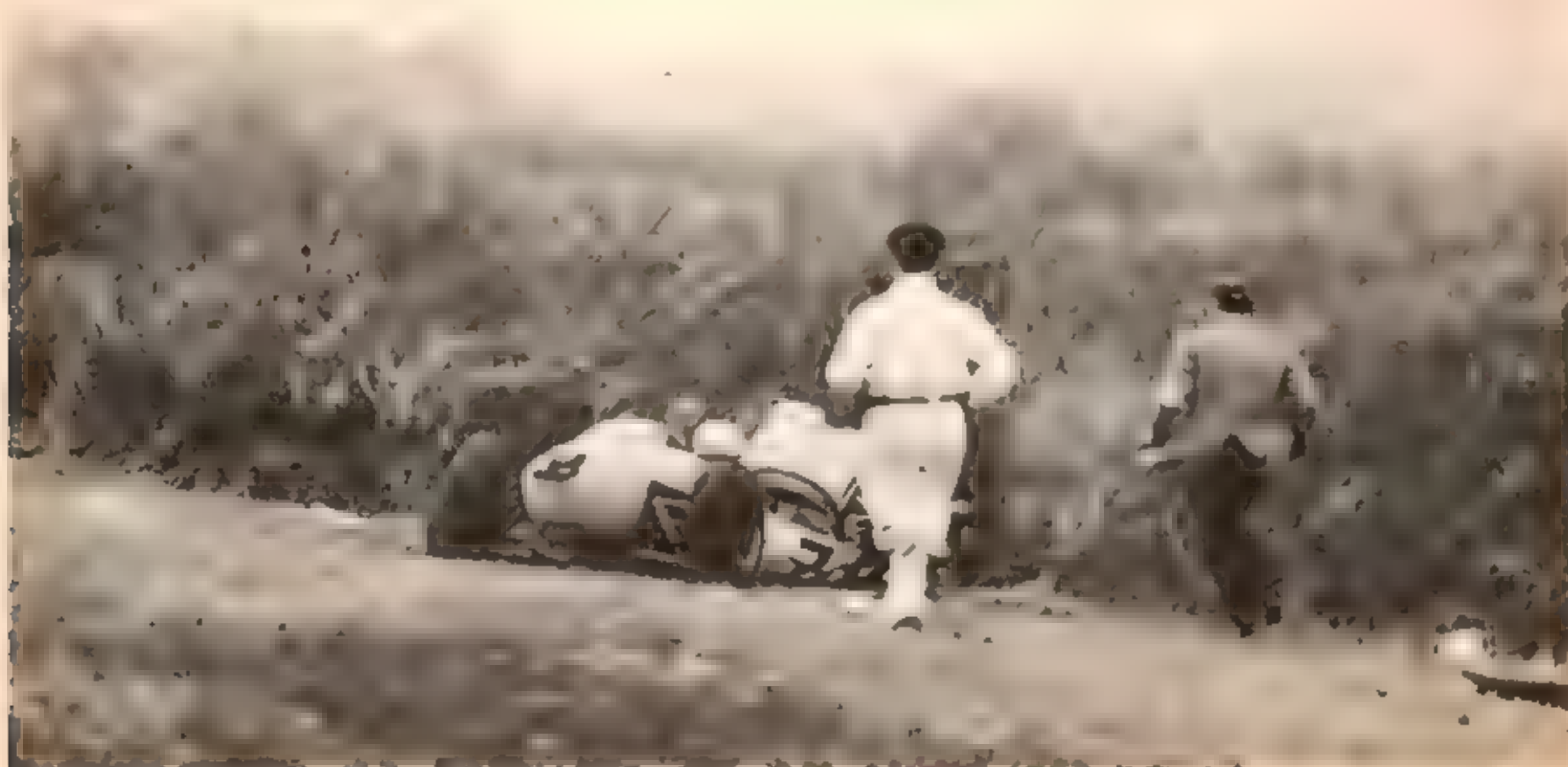
throttle started sticking on the Lotus and he pitted. Was it significant that Moss should have been troubled with a sticking throttle on the new V8 at Snetterton and that Surtees should experience the same problem at Goodwood? Moss was up to seventh and had just equaled Surtees' new lap record as Graham turned his 10th lap safely in the lead.

Now he could see the tail of Graham's BRM ahead and he was closing the gap fast. Out

in front Graham was setting himself a commanding pace but did not have to extend himself to hold the lead. He could see Moss coming up but he knew that after his pit stops Stirling was not competing to win.

Now the mystery starts to roll in and unravel what actually happened to trigger the incident that sent the Lotus arrowing apparently straight across 75 yards of grass into the bank.

The first rescuers arrive to aid Moss but it was to be more than half an hour before he could be cut from the wreckage



Amnesia has blanketed any memory of the accident from Moss and looking back now he can only attempt a hypothetical re-creation of the incident. Graham took a line of his own through Fordwater which used up more road than was normal, but this in itself was not unusual since drivers tailor their tactics necessarily to other drivers' styles. Moss thinks that Graham was given a blue flag to signify he was about to be overtaken and that when Graham waved acknowledgement of the flag, Stirling mistook this as a signal to pass, started to line up for a sweep round the outside of the BRM and then realised Graham was closing the road off to take his line through the curve. By this time Moss was committed to either hit the BRM or take to the grass, and he took the latter course.

So Stirling's theory is that the accident began because he mistook the signal of another driver.

Graham discounts this entirely. "I never acknowledge the blue flag. I just don't acknowledge it, I never have and I certainly didn't do it then." Graham says Stirling came almost alongside him with all four wheels on the grass. "I gave up racing and just watched. The car went over a bump, there was a flash of flame from the exhausts and it kept going straight into the bank." On the next lap Graham slowed almost to a crawl shouting to ask if Stirling was OK, and then went back to the job of winning the first race for the BRM V8.

Graham's theory is that the brakes must have failed otherwise there would have been marks on the track or torn turf where he had tried to brake on the grass. If the steering had failed or the throttle had jammed, Stirling would have still been able to attempt a braking manoeuvre. So far as an RAC scrutineer's investigation of the wreckage was concerned, there seemed to be no apparent malfunction of any vital part of the car prior to the crash.

Both Cooper and Hill mention the flash of the flame. Cooper was not sure whether the flash came from the exhausts or from under the car when it hit the bump and bounced. Could it have been a magnesium flash from the underside of the transmission striking something solid? Graham is positive the flash

came from the exhausts because on the first Coventry Climax V8s the pipes came straight back, high from the middle of the Vee. Could Stirling have been put off by the throttle jamming just as he changed from fifth to fourth and been carried into the beginning of what looked like a passing manoeuvre—and then switched off the ignition? The engine was undamaged internally, but if the ignition had been switched off and the car was still rolling and in gear, the combustion charge could have passed through the heads into the exhausts and ignited in the hot tailpipes. A slim chance, perhaps, but a possible explanation for the flash of flame.

The other curious aspect is that Stirling appeared to take no avoiding action. Cooper's photograph shows the car off the track and heading for the bank with scarcely any steering lock applied to the front wheels. Could it be that Moss was trying to squeeze past the bank applying minimal steering to avoid losing control on the grass. Graham Hill doubts this because he says the car seemed to go straight ahead into the bank.

The photograph of Moss on his way to that near-fatal appointment at the bank is important because it shows no signs of chassis or suspension breakage, or smoke or flame from the engine indicating failure; it also shows Moss upright and alert in the cockpit countering a theory that he might have collapsed at the wheel.

The point that amazed Cooper was the length of time it took Stirling to crash. "I had time to realise he was off the track, sight and shoot the photograph, crank the Mamiya on to the next frame—it had a very slow action, completely the wrong equipment for this sort of action work—and shoot again just as the car hit the bank."

"As it hit I remembered my dream. It was the same huge CRUMP, a muffled sort of thud, and it all came back to me. The dream and everything. I felt sure he must be dead." Cooper ran across the track and was the first person at the wreck. Moss was semi-conscious and mumbling, but there was nothing Cooper could do immediately to help and he stepped back out of the way of officials now arriving on foot.

The front of the spaceframe Lotus folded

in on impact with the bank and the left front wheel came back almost to the cockpit. It took a rescue crew almost half an hour to cut him free and he was taken to hospital with extensive head injuries, and injuries to his shoulders, knees and ribs. Broken bones had never fazed him in the past. Only two years before when his Lotus shed a wheel at Spa he had broken both legs, damaged his spine, cracked ribs and fractured his nose but he was back in a car and winning a Grand Prix by the end of the season.

The head injuries were the worst aspect of the Goodwood crash. While the rest of Moss mended on schedule, his razor-edge reactions were dulled to the point where he had to almost instruct limbs to perform duties that had been split-second reflex actions in the past.

The modern Moss is a bustling executive seldom still, working from his office at the foot of his Mayfair mews house almost in the shadow of the London Hilton. But Moss the racing driver is no more, just as the Goodwood track is also finished for competition. Stirling now limits his cockpit appearances to outings in a spidery, purpose-built special in low-speed mudplugging trials, a peculiarly British form of motorsport.

His reputation as one of the greatest racing drivers of all time lives on in the record books and in the minds of enthusiasts. General Motors head of styling, Bill Mitchell, has Stirling's broken and bloody goggles in a glass case in his amazing racing trophy room at his home in Bloomfield Hills, Detroit, near a similar case that displays Caracciola's linen helmet and goggles along with the lap chart his wife kept when he won the German Grand Prix in 1939. At Monaco, a Grand Prix he won three times, the crowd still cheer him from the balconies as he walks down from the Metropole Hotel on the morning of the race, still with the same bouncy step that seems to single out style in a driver.

When the Italian magazine *Autoprint* fed all available race data into a computer it chattered out the news that Stirling Moss and Alberto Ascari stood equal as the greatest racing drivers of all time.

But the Goodwood mystery remains. What caused him to crash?

Waiting for the start, Moss had qualified his Lotus 18 21 Climax V8 on pole position for what was to be his last race, with Graham Hill alongside in the stock-pipe BRM V8.





HESKETH RACING

WISHES

everyone a Happy Christmas

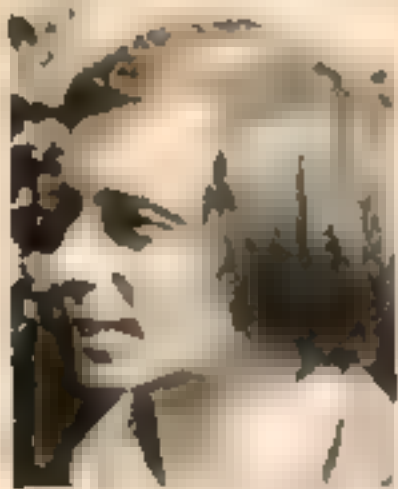
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big thank you to everyone

who helped us during the year



Purely personal



"Perhaps we might have some sort of statement on the policy of covering motor sports from the director of the BBC's sporting programmes"

BOB CONSTANDUROS

Did you vote for Jackie Stewart as Sportsview personality of the year on BBC television as you were exhorted to do by Mr C. J. Lewis (Correspondence, December 8)? I'm afraid I didn't but he won anyway so we may take heart that he didn't need our votes, but I do feel that Mr Lewis' argument is an extremely valid one. He pointed out that if a motor sporting personality won this title of Sportsview Personality of the Year, would there be more televised motor sport?

It is possible to look slightly further than just this one programme, for one must bear in mind that not only has Stewart won this television title, but also the sports personality of the year voted for by Daily Express readers, and indeed was voted Man of the Year a title which is not only open to sportsmen but men from every occupation. I wonder if Mr Stewart would mind if we shared some of this glory for as well as he being honoured, so is the sport, although obviously with his policies strictly in mind.

Perhaps another interesting point is the "personality" aspect. Two years ago Jackie Stewart and Graham Hill shone as personalities with a highly amusing interview in the Sports Review of the Year on BBC, although who was doing what to whom was never quite clear! This year saw the comic duo at it again, and once again proved to be a high spot of the programme, coupled with Muhammed Ali again adding his own brand of humour. With these two repeats, perhaps we can begin to think that British sport is somewhat lacking in personalities, and that the same old names are being retained to give the programme some humour and "personality," which they certainly do.

But to return to the fact that it was someone from our sport who was honoured with this title; it means that more viewers and readers of the Radio Times in particular, were interested enough, and felt that they knew enough about the man to vote for him, even though they weren't necessarily motor sport fans, but could, perhaps be more interested in show jumping or football, or one of the many sports which has more TV viewing time than motor sport. To some extent, this too is an honour, and perhaps, it is a shame that few if any of those viewers will ever read what I am saying, nor will they find themselves therefore the chance to retaliate and tell me that, perhaps, the only reason they voted for Stewart was that they didn't like anyone else!

However what's for the future from BBC? What return (which Mr Lewis amongst others expects) will the BBC give us for our sport coming out tops thanks to Mr Stewart? Despite what must have been a severe blow dealt by our Mr Titchmarsh to the BBC's motoring fraternity, we do hope that our quota of sport will be stepped up. We've received some good coverage, but I find that very often it's not what we want to see that is televised, but what the BBC thinks we want to see. I understand Murray Walker does a great

deal of homework when covering a meeting and I normally find that his information and coverage is pretty good. As for the old steam radio, Robin Richards' recent letters speak for themselves in proving the amount of coverage allotted per event, although not everyone favours the style of coverage.

It would be nice to feel that our sport will be well covered on television although so many of us won't even be around when the sport is covered on Sundays, but after our honour which we share with the World Champion, perhaps we might have some sort of statement on the policy of covering motor sports from the director of the BBC's sporting programmes, which might make our readers either cheer or cry in disappointment and desperation, which won't be the first time!

Minis galore!

What have Ian Bax, Mick Moss, Jon Mowatt, Peter Crouch, Jim Burrows, Sedric Bell, Chris Tyrrell and Jo Baily got in common? Well, it's fairly easy to say that they all race Minis, but what have they not got in common? The answer is that they all race in different classes of Mini racing, or where Minis are allowed to race: G1 Minis, up to 1.0 G2 and special saloon Minis, up to 850 cc Minis, up to 1.3 G2 and special saloon Minis, not to mention the Mini formulae Mini Seven and Mile Miglia. Now if I said that I didn't enjoy watching Minis racing, I would be lynched by the largest bunch of racers in the country second only to Formula Ford drivers, and I told them what I thought of them the other week!

However, I am confused, and I must confess that I get fed up with watching Minis turning out for almost every saloon car race. Indeed, I feel that it must be somewhat frustrating for a G2 Mini man never to receive the same "lineage" as a special saloon Mini man, or a Miglia man not to receive the same publicity as a special saloon man does. I recognise that there is a tremendous need for cheap racing,

and a Mini is obviously one way of going racing, and nearly always finding an entry where other classes may be oversubscribed but oh! how I get fed up with them!

Look at it another way. Should I write that Jon Mowatt warrants his entries in G2 races (which won't apply next year of course), or is Ian Bax the Mini ace of the country? What would be interesting to find out is who the ace Mini driver in the country, perhaps in the same way as the Formula Ford festival determines certain leading runners in that Formula. We see them all throwing their different spec Minis round endless circuits throughout the country week after week, and just wonder what is achieved at the end of it. If you're Miglia champion at the end of the season, it must be terribly galling to know that there's about another five champions in various different classed Minis throughout the country who may, or may not, be able to topple you off that seat!

What is even more difficult is to know how the situation may be resolved, and perhaps, like John Aleo a week or so ago, you agree that there should be even more small special saloons and saloons, and do not want to see less of the Minis. Even if one does suggest an alternative, there never seems to be any drift away from this type of car, although, occasionally, certain classes find themselves undersubscribed. Perhaps the solution is to put them all into one ruddy great festival, and see how they come out, although with all the different classes it could be hard to decide on the winner, and I for one would loathe to report it. On the other hand, could one have local championships at the same time reducing the number of classes for Minis, the up to 850 cc special saloon car class for instance, amalgamating with the small Mini Sevens to make one huge class of which various rounds could take place around the country. At least critics of my suggestions may take heart in that fewer Minis will be about next year with the demise of G2, but bear in mind that by supporting Mini racing, you are supporting a company which does very little in the Ford sort of way of promoting the sport.

Mini antics at Brands Hatch, but are endless British Leyland tin tops entertaining?



The motor racing year—yours for £1



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Autosport Christmas Quiz

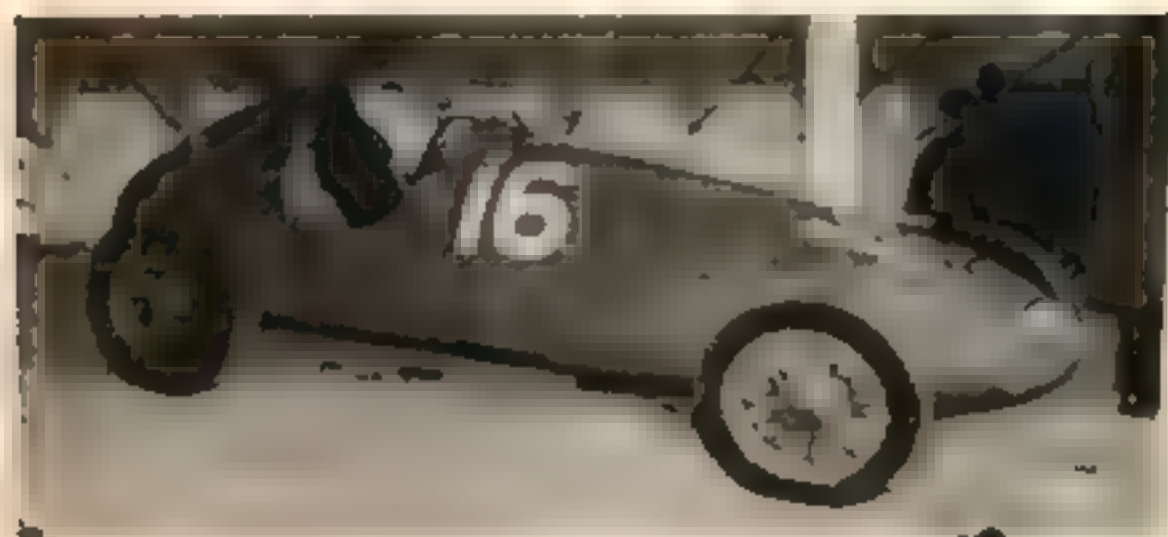
With virtually no motor sport this holiday period, we've been digging through our files to provide a mainly historical quiz to which we will give the answers in next week's issue



A Name the four drivers in this Brands F3 race.



B. A bunch of GT cars at Goodwood in 1964. Name the first five drivers, well known in that era



C A famous flop. From which country and what is it?



D In which class did this car race, what is it and what was so special about it?



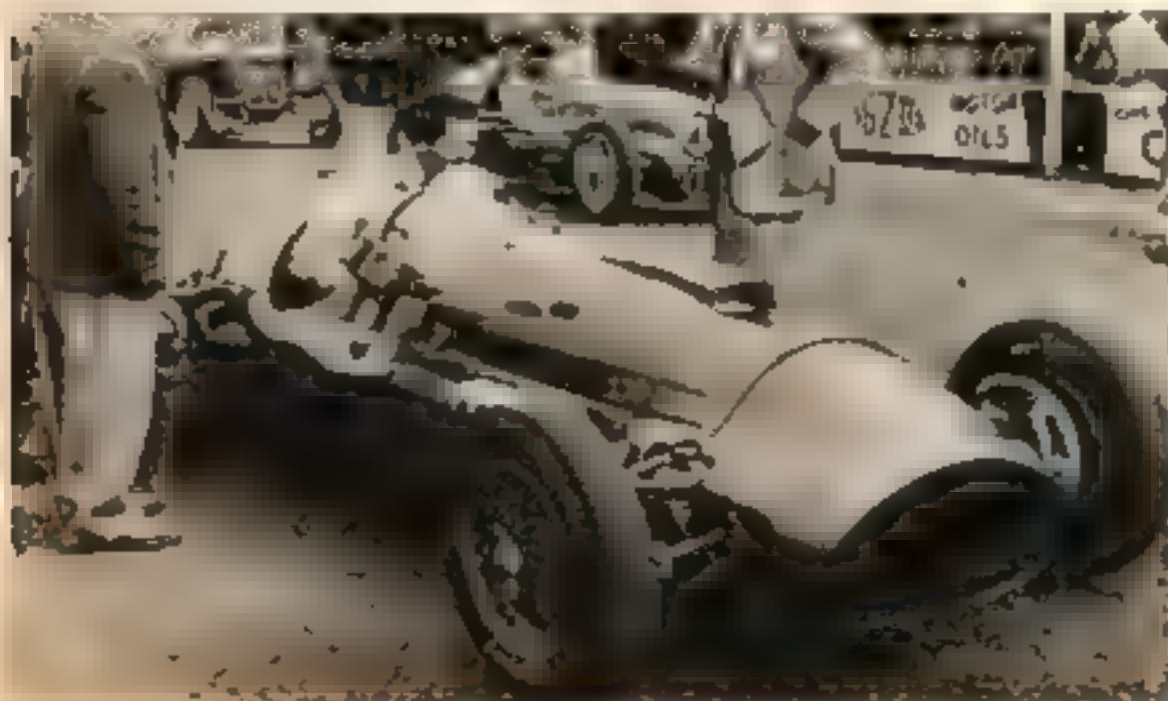
E An Aintree 200. Name drivers of both cars, and entrant of the first.



F. A Le Mans contender. What year, what is it and what is it powered by?

G Which was this F2 contender (the name is connected with the country), who drove it and what engine did it use?

H What connection does this picture have with Formula 5000?





I. Two former racing drivers and famous BRDC personalities in this picture. Who?

1. What American driver, who raced in Europe, chewed a cigar while racing?
2. In which World Championship Surtees first appear in a car bearing his own name and what was its first victory?
3. In what World Championship Grand Prix did seven drivers share fastest lap?
4. Who scored the only March 1-2 victory in Formula 2 in 1970 and where?
5. On which racing circuit would you have found Pub Corner?
6. Where are the Novamotor headquarters?
7. Name the odd one out and why—Kyalami, Silverstone, Watkins Glen, Montjuich Park, Monaco, Zandvoort?
8. What British team of the sixties featured two unrelated drivers with the same surname and who are they?
9. Which Grand Prix took place where no cars retired and none made pit stops?
10. Name two air-cooled engines to appear in post-war Grand Prix racing?
11. What first American team won an FIA Championship?
12. "It's the most frightening and diabolical machine I have ever had the displeasure to drive" Who said it, about what?
13. A USAC track driver raced a Maserati in the 1958 French GP. Can you name him?
14. Which was the first race win in Europe for a supercharged racing car?
15. What four drivers set a new record for Jaguar with an XK120 coupe in 1952 at more than 100 mph for 17 days?



J. Name the driver who is neither Mexican nor jumps



K. Name car, driver, co-driver and event



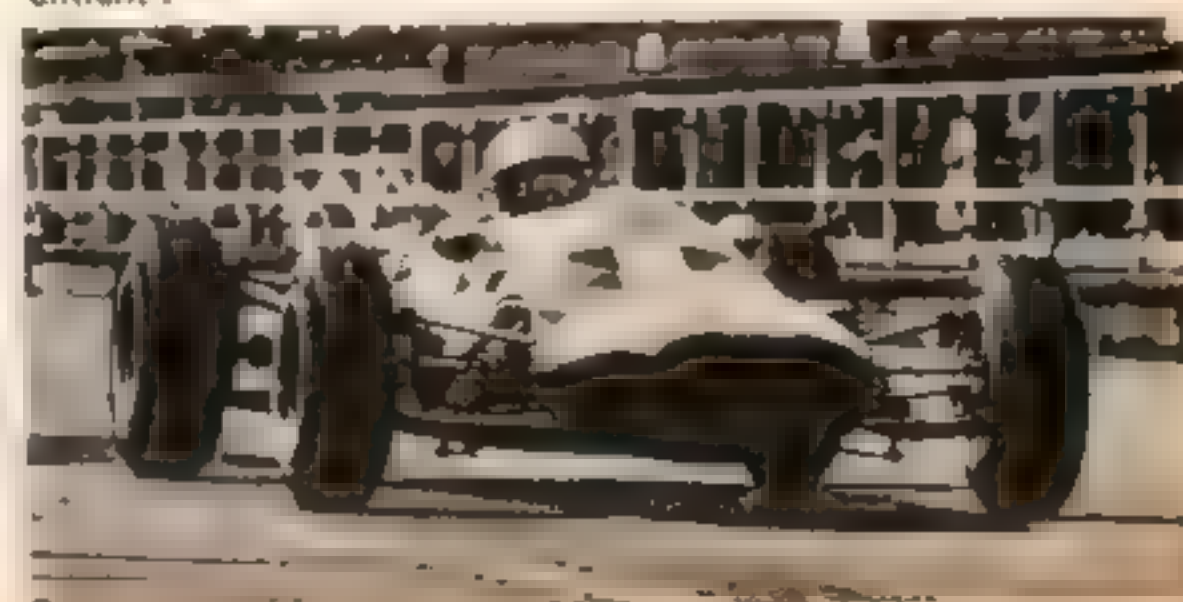
L. A famous victory for Panhard, which event, who is driving?

N. A FJ entry of the early sixties. What car was it, powered by what engine and who drove it?



M. Name these rally personalities

O. Don't be fooled by helmet. Who, what year and what is the entrant?



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The year of Jarier and March-BMW

By IAN PHILLIPS



What need one say? Jarier throws the championship-winning March very sideways at Hockenheim (above). The champion himself, Jean-Pierre Jarier (below).

"Jarier, March and BMW dominate," that was the headline AUTOSPORT gave to the first F2 report of 1973 way back in March. We could have written it eight times over because that was the story of Formula 2 this year. The young Frenchman took the same red works March-BMW 732 to a total of eight outright wins from 13 starts. He finished second in two others and retired in the other three—a remarkable record and one which made him undisputed champion as he had nearly twice as many points as the second man in the table.

Such domination on paper might look as though it was a tedious year—far from it though, as the style in which Jarier went about winning was exciting to watch. The efforts of the other manufacturers of both engines and chassis to break this combination also provided a great deal of interest, certainly for the first half of the season.

But it was not altogether a great year of F2. Although the racing contained much of interest to begin with there were too many political problems in the running of the championship to allow it to continue in a healthy state to the end. The problem was the very nature of the championship itself—the FIA decided F2 was a good thing and that it should have a much enlarged championship for the year and a total of 22 events were pencilled in at the beginning of the year. The idea was that these would be split into two with 12 of them counting as basic events and the remainder as optional but with the normal points being awarded. Of these 10 a driver could only score in four of them and they had to be in different countries. If a driver started one of these optional events, whether he finished or not, then one of his four options was gone.

It was a ludicrous situation and should never have happened, but despite much pleading it went ahead. A number of events were cancelled because the organisers could not afford to put them on and in the end there were more organisers wishing they had done the same thing. The large number of events, there were 17 in the end, took its toll among the competitors and in the final few races fields were very thin. Unfortunately the races were not even put into the calendar with any sort of thought and there were cases when there would be five or six events run on consecutive weekends and the teams were just not up to it. Engines are expensive things to maintain and have to be regularly looked at and it was just not physically possible. Also what did not help was that the F2 prize money scale remained as static and low as ever while the cost of going racing soared. Privateers dropped out of the scene regularly through the season while at the end a

number of the works teams were wondering if it was all worthwhile.

Unfortunately until the beginning of the year when the crisis began to develop there was no really effective or fully representative body to represent the formula in Paris. An F2 Association did exist but did very little. When it finally got itself sorted out it was very nearly too late. As it was they had to send telegrams to the organisers saying that unless they could re-arrange the prize money scale and give a minimum guarantee then they would not build cars for 1974. Unfortunately the constructors still could not put up a totally united front and the desired effect did not really happen. The fact that those totally involved in the boycott threat were those who had struggled throughout the year with Ford engines which prompted the cynics to say that it was just an excuse to get out after defeat. Although most of them would admit to it being a fairly hopeless task



without BMW engines this was not the prime motive, Formula 2 is a good formula and a necessary one in the structure of racing but the organisers cannot expect it to continue if they persist in avoiding to pay out the proper sort of money. Generally speaking it costs somewhere near £1500 per car to start an F2 race and except for those finishing in the first two or three places and claiming maximum trade bonuses there was little chance of anybody getting away with less than a £1000 loss—spread that over 17 races and you've got big trouble.

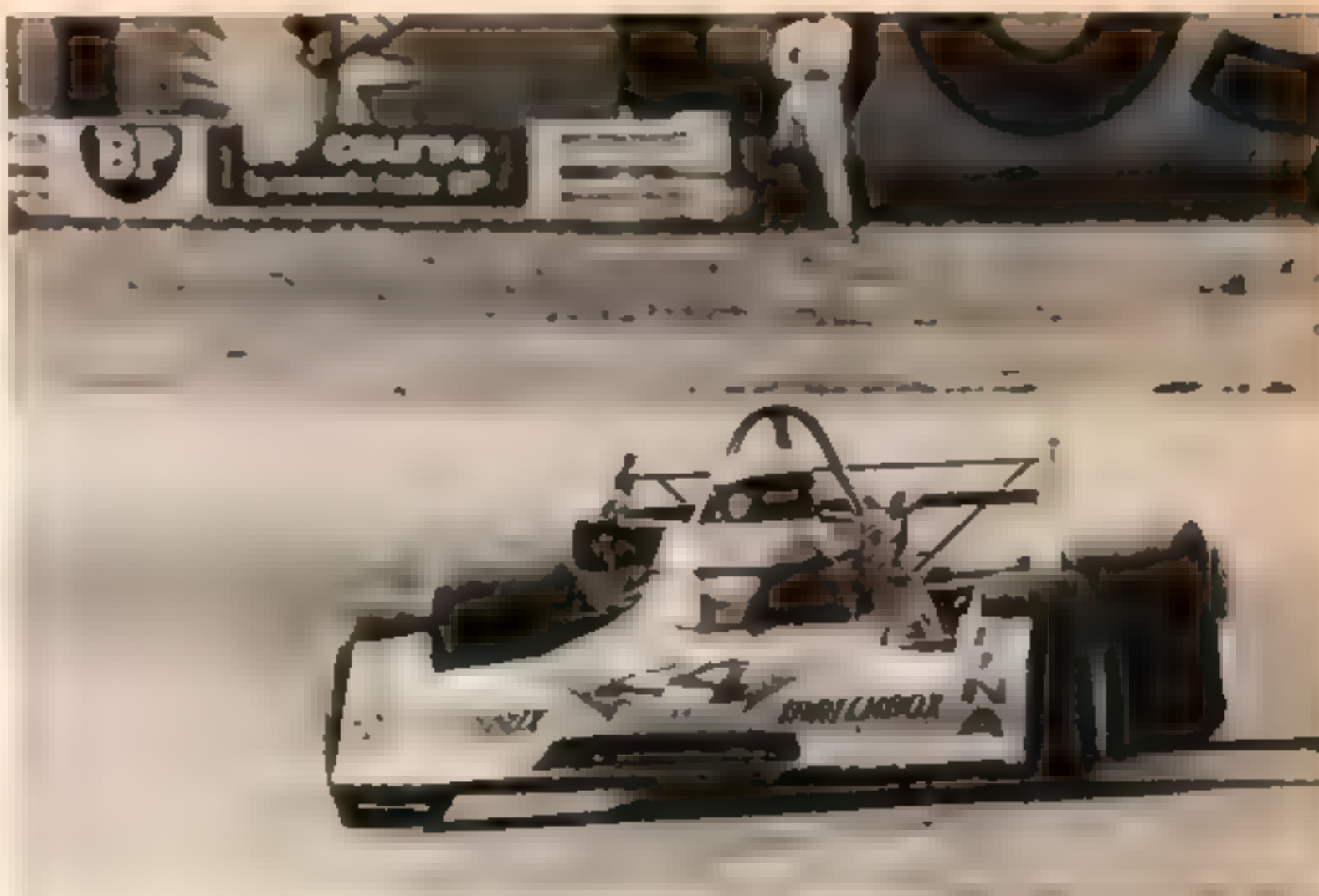
The main problem is the persistent idea of running graded and non-graded drivers in the same race but on different deals. Although the majority of organisers will not admit it they were paying out something close to the minimum guarantee which the constructors

are demanding for next year—195,000 SF. Unfortunately this is split up in a most ludicrous way. A minority proportion is spread among those non-graded drivers who are competing for the championship while the majority is paid to the graded drivers or "star names" who are not even competing for points and on this year's showing most of them would not have got any if they had been eligible anyway. If certain non-graded people did not turn up, the organisers just kept the balance of the money which they were supposed to be paying out instead of sharing it around.

What the constructors are demanding and quite rightly so is that both graded and non-graded drivers should compete on equal terms and all be subject to the same financial arrangements. For some very obscure reason the organisers cannot see this at all and it will be only them to blame if next season they have grids of graded drivers only in scarcely competitive cars which barely do ten laps anyway.

CONSTRUCTORS

A healthy number of constructors participated in F2 during 1973, which bode well for healthy competition but in the end it was dominated by one marque, March. Much of their success has been put down to their exclusive contract with BMW for engines but if a car does not handle or stop or put its power on the road or go through the air swiftly then a good engine is not really much help. This year's model, the 732, was probably the most compact F2 car with its snub nose and high cockpit surround. The chassis itself was simple and was really a combination of the best features of the 712 and 722 series. The prototype car was testing at the end of 1972 and this was carried through extensively right up to the start of the season mainly under the guidance of Harvey Postlethwaite and then Robin Herd. The secret behind the success is that March were able to take the one known factor about the set up, the engines—and then develop the chassis, tyres and everything else around it. The car's braking capabilities were tremendous and this coupled with the tremendous torque of the engine and the way the car squatted on the ground made it immeasurably superior in corners. The straight line capabilities were not significantly better than any others although development on the nose through the year improved downthrust and



Jochen Mass established many excellent performances with the works Surtees to finish second in the championship.

very good, but the engine and it was a great shame that the opportunity didn't arise for a Ford powered chassis to race in F2. Of course basically the same car was used with BDA power in Formula Atlantic where it was also dominant.

Of the Ford powered runners there was really very little to choose between the chassis. All the major manufacturers had some success during the year—usually when the works Marches or Jarier was absent.

For Surtees it was not such a successful season as had been their debut year in 1972. Late in October of last year the new TS15 appeared and was looking pretty good when it ran in Brazil against wholly Ford powered opposition. The car was very much a development of the championship winning TS10. The monocoque was new but generally there was not much else radically changed although the drivers were much happier with it. That the car was not more successful must be put down to outside factors such as tyres in the early part and that the very best in Ford engines which they had from Brian Hart were really not quite up to the BMWs although team leader Jochen Mass came very close on occasions.

Mike Warner's GRD set-up made a big effort in the formula initially with their 273. This was a logical development of the 272 which appeared spasmodically in 1972. The car featured a wide nose, side radiators and a wing hung out well in the breeze at the back. Although they sold a lot of cars they suffered in that they had not got a works car on which to do development. The works effort was ploughed into a private team and this just did not really work out although unsuitable engines and tyres did little to help. Although they ran more cars than most right through the year the works interest in the category waned when there were no top line drivers in the cars. The impression given by GRD though was that perhaps they had taken on too much in a formula which demands so much time and attention and there just was not enough experience to get them through the early difficult stages.

Also much criticised during the year were the Rondel Racing built Motul M1s. Designed by former Brabham man Ray Jessop these were the first cars to come from the enthusiastic set-up run by Ron Dennis and Neil Trundle. The first car was tested and showing good form in October, '72, but their delayed debut at Hockenheim did little to suggest that much development work had been done. Like GRD they suffered in that they did not have the right engines available,

but they turned the tables for the second outing at Thruxton when Henri Pescarolo scored a good, if somewhat lucky, win. The problem seemed to be that the car did not put its power on the road properly, but this was not really pinpointed until the latter part of the year. Initially the drivers took time to set the cars to their individual likings in that the testing had been done on one chassis and mostly by one driver and the replicas were built to the same specification and settings which did not altogether suit everyone. The car was not radical in any way and really would have been in the same class as any of the others had the right engines been bolted in the back.

This year was probably the last of Brabham in F2. Geoff Ferris drew up the sleek looking BT40 in the middle of 1972 and it again was ready in October. Somehow it all looked right and on occasions went well, but there just did not seem to be the



Jochen Mass—Matchbox Surtees.

penetration. A number of competitors plumped for the March at the start of the season but there was a second mighty swing towards the Bicester direction in the middle of the year when people gave up the struggle with their original choices. The main factor was not so much the car, which was obviously



Patrick Depailler—Coombe Elf

interest in making F2 a big project. The works put up a good showing at Mallory Park with John Watson, but after his accident at the Race of Champions Wilson Fittipaldi took over the car and with numerous engine problems nobody really seemed too keen on developing the car. Andrea de Adamich had a

Hart BDA and put up a terrific display at Nivelles to show that there was nothing really wrong with the car. The works car was the first non-March to run a BMW engine, a Schnitzer mill at Rouen, and things improved, but its only win was a lucky one at Misano, with a Wood BDA. Although it was an attractive looking car very few customers actually bought them and it was rather sad to see the marque decline so rapidly in the formula.

Chevron have played around in the wings of F2 for a number of years, but after some very encouraging performances in 1972 they set up an unsponsored two-car team this year with Derek Bennett's B25 design. It was a brand new car kept very simple and straightforward in true Chevron tradition. They had a tyre problem at the beginning of the year, but at Thruxton Gerry Birrell showed the car's true potential with a really fast drive. After his tragic accident at Rouen the team ran just one car for Peter Gethin or John Watson and both of them showed the car to be very competitive—all it really lacked was a BMW engine although Gethin's stirring chase of Jarier at Karlskoga showed they were very much on a par with each other. For an unsponsored firm to compete in F2 it is a very expensive business and it is to be hoped that they will continue to participate because the car is perhaps the most under-rated in the class at the moment.

The crudest car in F2 was undoubtedly the Alpine-built Elf 2s which John Coombs ran. Crude they may have been, but effective they certainly were. The sturdy space frame chassis and lightweight all-enclosed bodywork enabled it to really fly down the straights. The only problem on the car at the beginning of the year was with the brakes which was a leftover from the development car run in 1972. The wrong lightweight materials had been used and under full application the heat was causing certain components to distort and thus reduce the effectiveness. However, this was sorted out early on and after that the cars had little trouble except a couple of nasty hub failures at Hockenheim and Estoril.

The big disappointment of the year was undoubtedly the Lotus 74, christened the Texaco Star. Not only was it the first F2 chassis from Lotus for four years, but it also had the Novamotor developed Lotus/Jensen-Healey BDA engine aboard. The chassis never really gave a great deal of trouble in its performance, but the advanced Ralph Bellamy design was just too complex for F2. The car was very big (somebody said they had spotted DFV mounting points, but this was untrue at the time although an F1 along the same lines must be on the cards) but seemed to handle well and the rear mounted radiators were undoubtedly a success.

What let the car down badly though was the engine. Although it had been under development for a considerable time there was no way it would hold together initially and when it did there was no power anyway. Whether they will appear again is somewhat doubtful—the drivers were none too enthusiastic about carrying on in the formula although the team benefited from the ludicrous F2 financial arrangements in that they had Ronnie Peterson and Emerson Fittipaldi to drive for them and organisers wanted to pay big money to see them just scratching about in the formula.

The French Pygmies concern reappeared once more with their MDB18 which was an updated version of the MDB17 with suspension and bodywork changes. Once again the effort failed—this time more dismally than ever and the ever-optimistic Patrick Dal Bo disappeared from the scene early on leaving Francois Migault to splutter round on occasions.

Bob King's Royale concern produced a neat, conventional prototype F2 at Nivelles for Manfred Schurti, but engine problems let it down. A purpose built car was made, but due to internal problems did not race this year.

A new name in racing cars appeared in F2 at the beginning of the year—the Scott. Commissioned by privateer Richard Scott it

was a very neat design by Patrick Head. There was nothing radical about it, the only feature being the use of a big spacer between the engine and gearbox which had only appeared in F1 and F5000 previously. The car was built and run to a strict budget and this ran out after five races and the car was never seen again unfortunately. Due to various problems the car only ran really well once, at Nürburgring, when Scott climbed up to seventh from the back of the grid.

ENGINES

1972 was the first year of the 2-litre F2 and the results in that season depended very much on engines all of a Ford variety holding together. The basic problem with the Ford unit was that the BDA was basically designed as a 1600 cc mill, but when the new regulations came into force there were no obvious full 2-litre engines to use. So everybody plumped for the BDA. Some tried stretching it to 2-litres and it appeared in many guises from 1800 to 2000 cc. To get over the problem Ford developed, in close conjunction with Brian Hart, an alloy block which would allow a full 2-litre capacity to be attained without the problems of the iron block. This alloy block was the basis of the hopes of the majority and its performances in South America at the end of 1972 indicated its superiority over the iron block versions. The big question mark hung over the full 2 litre 16 valve BMW engine which had been homologated for F2. Would it work, would it be reliable? Nobody really knew. Max Mosley took a gamble and by September of 1972 had announced that the engine would be supplied exclusively with March chassis the following year. He had obviously done his homework with Jochen Neerpasch very thoroughly and Mosley was confident that this would take disillusioned Ford users to March for their cars. Neerpasch agreed to build a batch of 50 engines and the competitions department would maintain

a certain number of them. The man responsible for Jarier's engine was chief development engineer Paul Roche and it is to his credit that Jarier did not suffer a single engine problem throughout the year. Other engines were built by Neerpasch's department while a lot of maintenance was done by March Engines in Reading. That there was a difference in the standard of preparation of these customer engines there was little doubt although it must be pointed out that installation had a great deal to do with it—electrical connections being persistently problematical.

Although Jarier ran away with the Mallory race it was not quite as rosy as it looked. Two engines suffered mighty blow ups due to incorrect pistons and at nearly £5000 a time this looked like being expensive. Luckily the problem was soon cured and there were no other serious defects. There was an overheating problem initially also, but this was soon cured. A faulty batch of relief valves cost some people a lot of money in June, but when the engines were going they went well although there was an acute lack of spares for some teams.

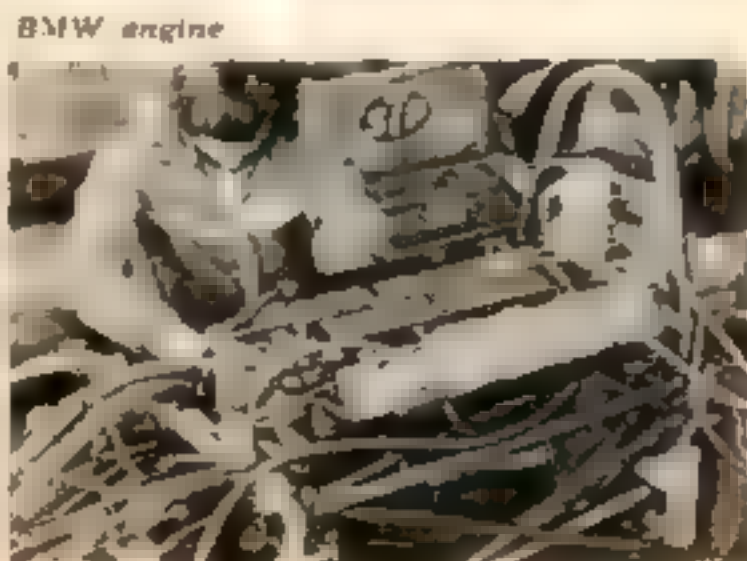
The advantages of the BMW unit were not so much its power (about 275 bhp) but the manner in which it was delivered. The engine had immense torque and off the line and round corners could not really be matched. On the top end, however, there was seemingly no advantage at all!

With the success of the works engines Schnitzer produced BMW units for non March owners and these appeared in a GRD, Brabham and Motul while the Brambilas used them in their Marches before preparing their own. GS Tuning in Freiburg also undertook BMW rebuild work.

If you wanted or had to have good Ford power there was only one place to go, Brian Hart's establishment in Harlow. Hart has a great deal of F2 experience and this has taught him to keep the number of engines available fairly low in order that his high standard of preparation could be maintained.



Lotus-Nova engine



BMW engine



Hart BDA

FVD engine



Thus, as well as being the most powerful BDAs, they were also the most reliable. The teams lucky enough to have these engines were Surtees, Elf and Chevron as well as a number of privateers. All three showed on occasions that they could almost match the BMWs.

Other tuning establishments produced BDAs, some with alloy blocks and others for political reasons with iron blocks. Among the names to appear on cam covers during the year were Racing Services (Norising winners) Race Engine Services (who won at Thruxton), David Wood (winner of Misano), Geoff Richardson and Sports Cars of Sweden (undoubtedly the most unreliable).

Other derivatives appeared known as the BDG from Cosworth, but this never produced any startling power.

One engine which was expected to go well and, in fact, did power the first two cars home at the Nurburgring was the FVD which was a homologated version of the FVC sports car engine developed by Alan Smith in Derby. After the Ring victory the engine was declared illegal as the FIA decided that they had not homologated it. Those teams which had pinned their faith on it, Rondel and Pierre Robert, were then left in a very difficult position. There was no time between races to do any development and testing with the engines and so from the beginning of May until early July the engines had to stay redundant in the transporters. When they were declared legal development had fallen well behind and they never really caught up.

What happens in the future? Well, it's not

really clear at the moment as BMW have not officially announced their plans, but it would seem that works engines will be available for everyone who wants them although presumably March customers will have preference. This is likely to turn the formula into Formula BMW which other than from the technical interest point of view will probably be no bad thing except that they are about £1,500 more expensive than any type of Ford engine. It was announced in the middle of the year that the regulations will again be changed at the end of 1976. Instead of having to rely upon a very limited number of production block 2-litre engines the formula will have unrestricted racing engines up to 2-litres with a cylinder limit of six. If the formula can hold out that long we should then be in for an exciting new technical era in racing engines.

TYRES

The honours in the rubberware department this year went to Goodyear, who had 12 wins in the 17 races. Their domination at the beginning of the season was almost total. The reason for this really being that it took Firestone a long time to recover from their brief withdrawal from racing at the end of 1972. Roy Forster the long time F2 chief technician left to become a team manager before returning to weigh up the situation and then handing over the formula to Jean Mosnier. Between them they worked out a



Motohara Kurosawa — March BMW.

solution to the problems and by July they were almost back on terms; by the end of the year they were on top.

Goodyear's trump card at the beginning of the year was a 2-ply construction which gave much more supple side walls and was very much superior. Firestone produced a similar tyre but it was never really a match for the Goodyear version and was prone to punctures. When Firestone had the construction sorted out Goodyear then went up to 28 in diameter which Firestone countered with a 24 in model. The big Firestone was not too popular when introduced at Karlskoga but the construction and mix was what the teams had been waiting for. Once back in Europe and down to Albi for the final major confrontation of the year for the first time the Brentwood lot beat the men from Wolverhampton who had all the big guns working.

Credit though is due to both companies, Goodyear for their consistently good products and the excellent service they gave to their teams, March, Elf and Rondel, and Firestone in their persistence which was well rewarded in the end.

An interloper at the end of the season was the Japanese Bridgestone company who financed local hero Motohara Kurosawa on a trip to Europe in a March-BMW. Obviously he was obliged to use their product and they were certainly not outclassed but the Japanese was more impressive when a customs delay forced him onto Firestones.

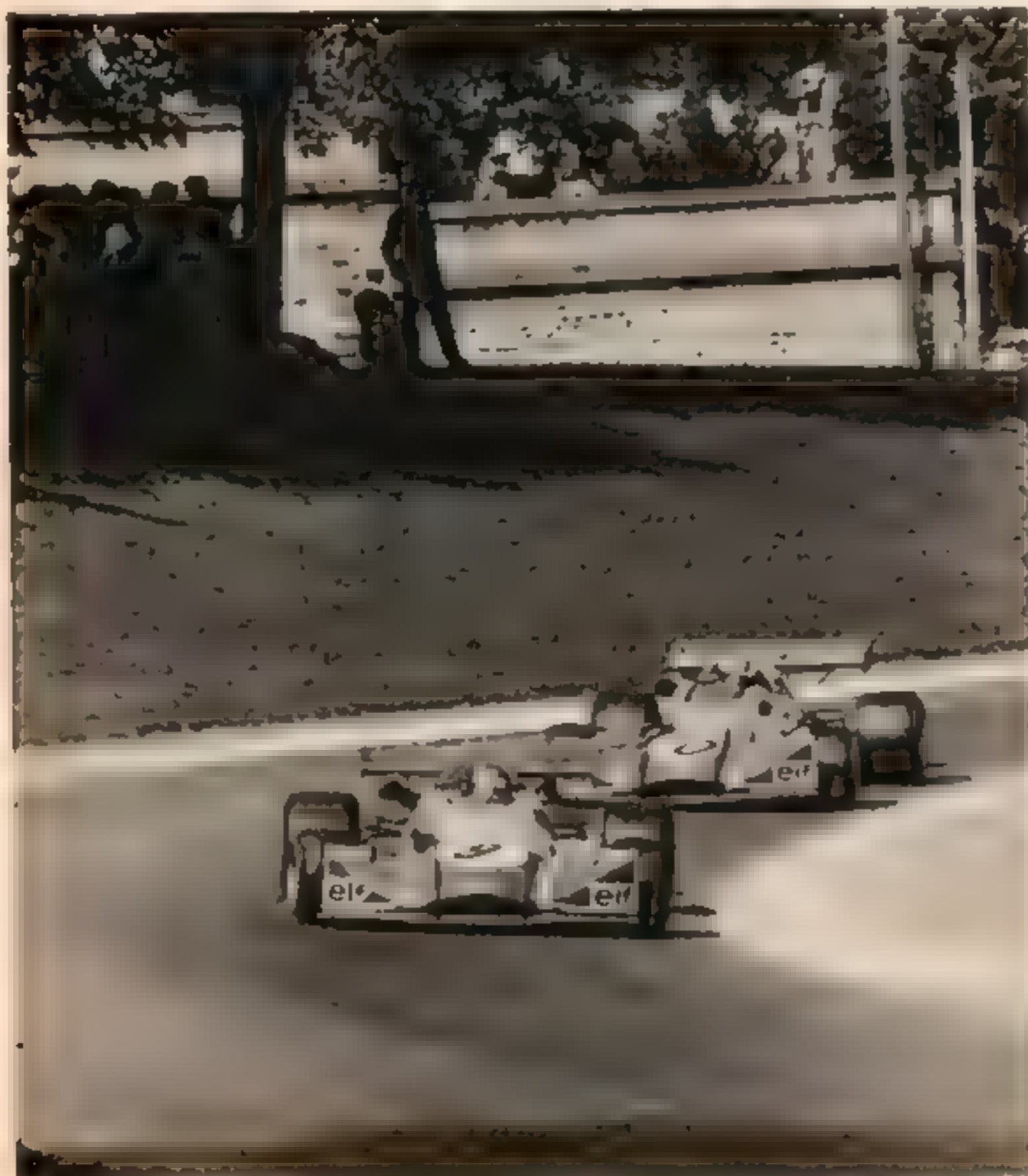
TEAMS

To have any chance of getting any return in F2 it is necessary to run at least two cars one of which will be driven by a graded driver. One team that opted on a

BMW v Ford — Neerpach (left) and Kransuss.



Elf at Pau... Depailler leads Covert





Vittorio Brambilla highlighted a good season in European F2 with two outright wins

strong team of non-graded men however and came out on top was STP-March. As well as Jarier they had Jean-Pierre Beltoise and Hans Stuck Jr to choose from. The team was managed, as in 1972, by Ray Wardell while Robin Herd was in attendance at the majority of meetings. There is nothing better than success to mould together a good team but the success for March would never have come about if it were not for the team of mechanics who enabled Jarier to race untroubled at every meeting bar one during the year and that was only a very minor problem. Those working under the seemingly unflappable Wardell were John Redgrave, Bernie Dooley, Wayne Eckersley and Arcadi Zinonov. Jarier himself puts his success down to the team even before the car and their record is certainly an enviable one.

Surtees once again ran in the colours of Matchbox and ran two cars on most occasions. Former BARC secretary John Wick-

Jacques Coulon — March BMW



ham joined the team to take care of the day to day running but at most meetings John Surtees was present to run the outfit. The cars were always neatly turned out and other than a spell at the beginning of the year for Mass the cars were reliable. Joining Mass on occasions were graded men Mike Hallwood and Carlos Pace and the ungraded Derek Bell while hire deals were done with Torsten Palm and Jose Dolhem on occasions.

The biggest of the works teams was Motul-Rondel Racing. After running four cars in

1972 it was thought that they would concentrate on fewer cars this season. But no Ron Dennis announced just after Christmas last year that he could run six cars from the works in two different teams. Drivers were to be Tim Schenken, Jody Scheckter and Johnny Gerber in one looked after by ex-McLaren man Richie Bray and Henri Pescarolo, Bob Wollek and Jean Pierre Jaussaud in the other sponsored by Motul and looked after by co-director Neil Trundel. Unfortunately this never worked out. The deal with Gerber did not materialise and thus a lot of much-needed sponsorship money did not come either. The cars were always run as one team and in their traditional style were the smartest cars on the circuit and for such a big team had a remarkable reliability record. The presentation of the team was of a high standard all the time but there were occasional political dramas behind the scenes with the drivers. After a couple of unhappy outings Scheckter left while, as is always the case, the situation of three French drivers in an English team produced much moaning and grumbling about how unfairly they were being treated. With the virtual demise of the non-French team and the infrequent appearances of the graded drivers, those left felt they should have spare cars and engines and so on. Unfortunately the problems with the FVD and non-arrival of a second sponsor drained the team's finances severely and they just could not hope to realise their ambitious plans. They undertook to run a car from the works for Tom Pryce which was paid for by Chris Meek's Titan Property concern. This car was maintained to the team's own high standards throughout.

After a number of years working as top man for different teams Brian Lewis set up his own operation this year to look after various March customers. He started the

year with Colin Vandervell and Mike Beuttler and ended it with Jacques Coulon and Motohisa Kurosawa with Andy Sutcliffe having been a brief visitor. Lewis' lot was probably harder than any having to tend to fussy foreigners none too inclined to speak English if the mood did not suit them and an Englishman who knew his rights. Engine supplies were the main problem but the cars were always on the grid and generally finished.

John Coombs took over the running of the works EM team with the Alpine built cars. To take care of the whole technical operation the old Felday set-up moved in which included old hands such as Peter Westbury, Jim Charman and Mac Daghorn to look after the two cars. Westbury left just before Rouen while the rest stayed although too much

Hans Stuck — March BMW



This week's colour centre spread

This week's colour centre spread shows Richard Roberts at Oulton Park in his Myson-sponsored March 733. Roberts is very much in the news at the moment as his smooth and consistent driving of the F3 March and, earlier, a GRD, has earned him a place in the works Brabham F1 team for next year.

Roberts, aged 29, moved into F3 this year after three years in FF. A friend of his, Bruce Giddy, set up the deal for F3 with a Novamotor-powered GRD sponsored by the well-known Norfolk-based heating and ventilation firm Myson. Richard scored two wins in the GRD before switching to a March which resulted in three more outright wins and a lap record at Brands Hatch.

At the end of the season he was joint winner of the Lombard North Central Championship and finished third in the Forward Trust championship.

Photo: Peter Burr

ANNOUNCEMENT

Richard Roberts has pleasure to announce that he has been offered a works Formula 1 drive for 1974 by Brabham

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John Watson's Chevron leads Baltoise, Moss, Pescarolo, Jabouille and Pryce at Albi.

French got them down on occasions. Patrick Depailler was team leader and as always suffered with niggling problems that robbed the team and himself of success but they did have a good win at Pau when Francois Cevert made his one and only appearance for them.

GRD ran a large number of cars from the works. At the beginning of the year they had Wheatcroft Racing, Team Nippon and various GRS customers. Directors Mike Warner and Derek Wilde attended all the early races but with the exception of chief mechanic Alistair Dimmock there was not enough experience in the set up to cope with the problems. Later in the year Dave Wilson took over but the works involvement had dropped somewhat as Wheatcroft went to March and had his own team.

The Chevron effort was looked after chiefly by Paul Owens while Derek Bennett and Grahame White put in a number of appearances and the cars always were immaculate in the works black (brown?) and yellow colours.

The Lotus effort was vast and under the control of Jim Endruweit. The cars looked

Bob Wallak — Motul Rondel.

good in the Texaco colours but it needed every one of the mechanics to operate the many engine swaps as efficiently as they did.

Rivalling Rondel for sheer showmanship in the paddock was the Pierre Robert GRD team from Sweden. Managed by Picket Troberg they had three cars for Reine Wisell and Sten Gunnarsson. The whole team had gimmicky clothes, bicycles, the lot, but underneath it all there was little to justify its existence. Wisell after his win at the Nürburgring became difficult and showed little interest and the racing side became a shambles although this must basically be attributed to the poor engines supplied by a Swedish outfit.

DRIVERS

To the majority the name of Jean-Pierre Jarier meant very little at the beginning of this year. Everyone seemed to have forgotten his rapid F2 drives in 1971 and his unbelievably hairy but rapid handling of an F3 Tecno before that. Last year he managed

Peter Gethin — Chevron.

some fairly miraculous things with various March F3 cars but still nobody really took notice. Max Mosley and Robin Herd knew that they had a quick man on their hands, all they had to do was to control his enthusiasm and channel it in the right direction. Few people will forget that amazing demonstration at Mallory Park which gave him only his second win in his career. Jarier knew he was on to a good thing and made full use of it. His enthusiasm for winning and winning by the biggest margin possible was incredible and to see him dominate a race as he was able to do at the start of the year was almost funny. He became something of a cowboy for a short while and failed to finish a couple of races and after a particularly poor performance in his heat at Pau the big stick of Mr Mosley put things to right. He started the final at the back of the grid and was told that if he was leading at the end of the first lap he would be sacked! The control operated from the pits had the desired effect and he put in a well-judged drive up to second place and maximum championship points. That was probably the turning point

John Watson — Chevron.



because except for one lapse at Rouen when he spun a 30s lead down to about four, he drove with greater skill and control—his defence of his lead against Peter Gethin at Karlskoga being a very good example.

He was very much a worthy champion and if he gets the right equipment in F1 next year maybe people will at last recognise him to be the driver he is.

Second in table was Jochen Mass who had a season of mixed fortunes in the number one Matchbox Surtees. He suffered some mechanical failures early on and when he at last finished a race he won it. From then on he was always the leading Ford-powered runner and his determination to fight with Jarier as long as possible made for some interesting racing. The fact that he was quicker than all the Marches bar Jarier on the majority of occasions says much for his driving, and technically his skill must rate higher than Jarier's.

For Patrick Depailler it was another frustrating year. After two full seasons in F2 he still has no win to his credit yet he appeared on the front row more often than not and yet for some reason could not get the right results. Tyres robbed him of an easy win at the Nurburgring although with perhaps a little more determination he might have held on. At the following race at Pau he was pulling away in the lead from Cevert when a loose wire stranded him on the circuit. After that perhaps a little desperation crept into his driving and he had a couple of untypical accidents. When things are not going right he tends to get depressed and it shows in his driving.

Perhaps the revelation of the year was Vittorio Brambilla. He and his brother became notorious for untidy and inconsiderate driving over the years and there was nothing to suggest in the early part that this year was to be any different. However when his brother quit Vittorio then had two Beta March BMWs to choose from. He went well at Pau, Nivelles and the second Hockenheim before going through a lean spell. This included a particularly old-Brambilla style drive at his native Monza which after trying to put Williamson out of the race he ended up in the bank



Tom Pryce — Rondel.

himself. After that he came back with some fine drives at Enna, Salzburg and Albi which included two outright wins. F2 will not quite be the same without a Brambilla if Vittorio moves to F1 next year but if he continues in the same vein that he had at Albi, he may do well.

Jacques Coulon was another to come good at the end of the year. His March-BMW was run by Mike Parkes and Filpinetti at the beginning of the year until Mr Filpinetti died and the team folded. With Antar backing he was run by the works before moving to Brian Lewis. He is undoubtedly a capable driver but his attitude and approach to the car and team was all wrong until Albi when a good row with Lewis cleared the air and he became happier and consequently drove better, ending with a win at Estoril.

Bob Wollek started the year really well with nine points at Thruxton followed by two more good scores at the Ring and Pau. After

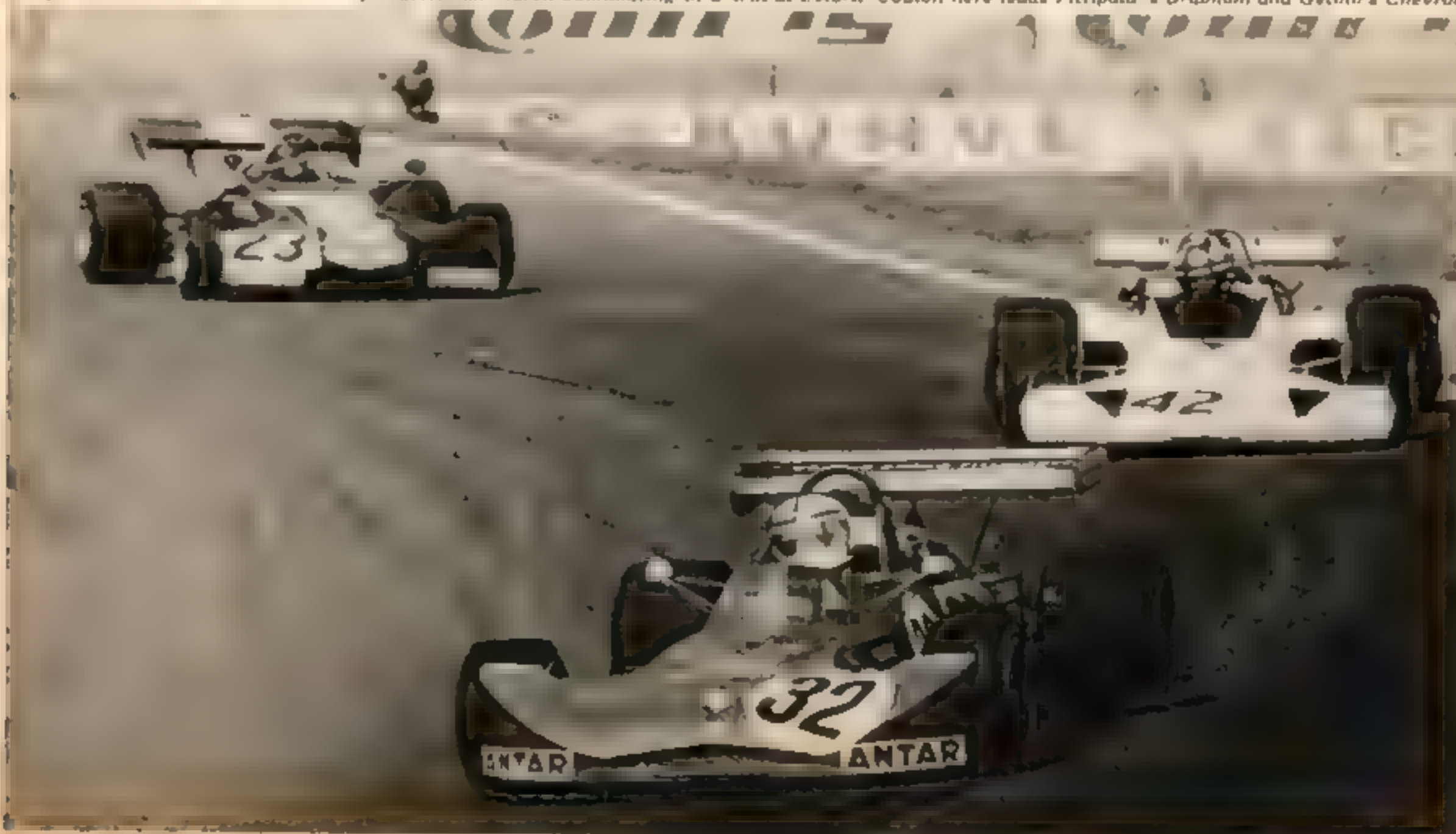


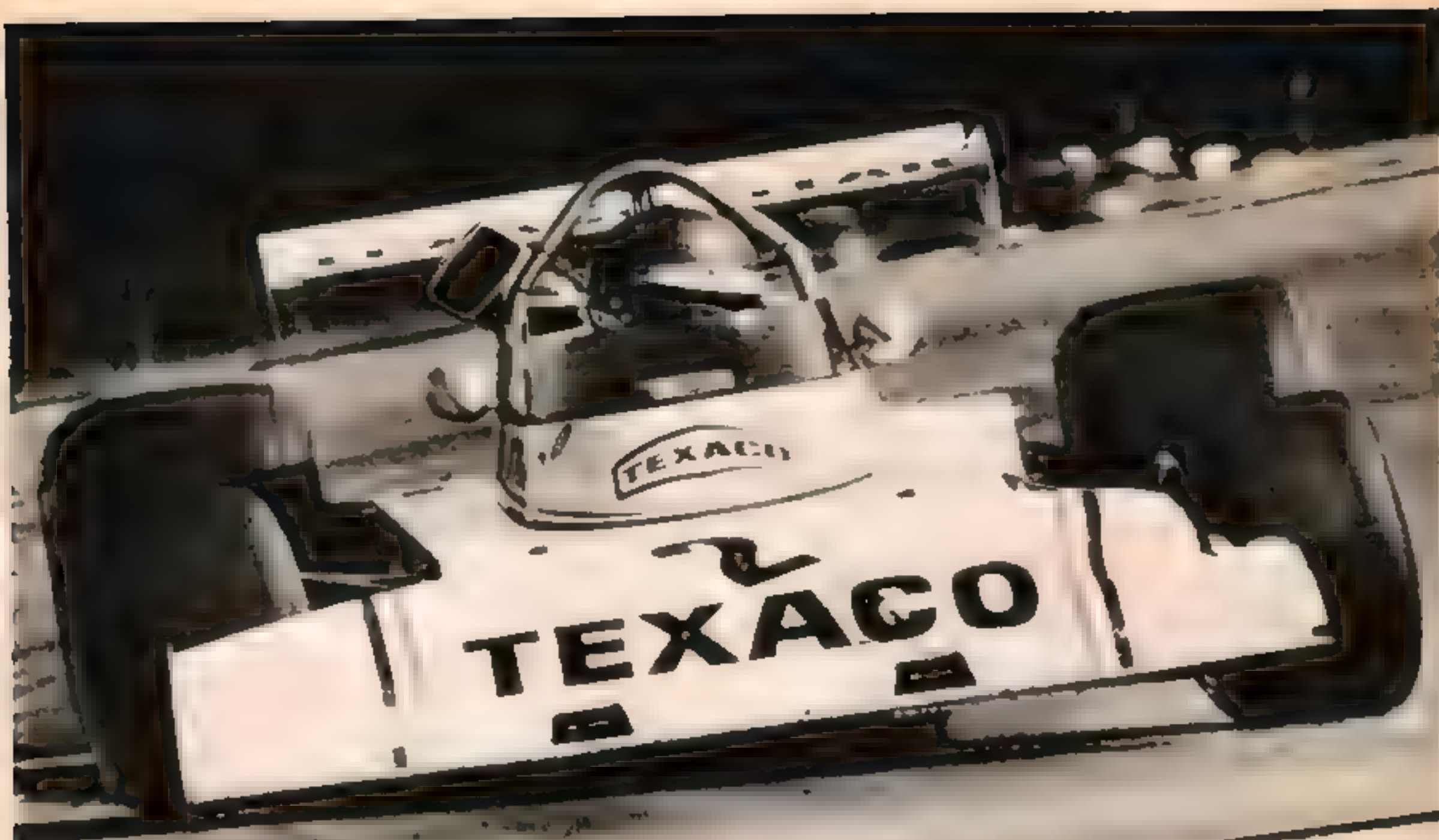
Vittorio Brambilla — March BMW

that he failed to score for a number of races and it tended to get him down. He's not over-endowed with talent but he has got great determination and is as brave as anybody. This could have been the best of his three years in F2 but the disappointing mid-season scores deprived him of the chance. If he gets the right equipment and luck next year he'll make it soon.

Mike Beutler's stockbroker consortium of sponsors bought him a March BMW run by Brian Lewis. It started badly at Thruxton when he was nerfed off but he drove well at Thruxton before getting involved in the last corner fracas which could have given him either first or second place. He had two fourths after that and it looked as though he was at last in for a good consistent year in F2. However he had a very nasty accident at Rouen which badly damaged the car and from which he was lucky to escape with only a damaged ankle. He then decided to concen-

Jacques Coulon went well with his privately-run March culminating in a win at Estoril. Coulon here leads Fittipaldi's Brabham and Gethin's Chevron.





The Texaco Stars were rather disappointing despite the determined driving of Ronnie Peterson.

trate on F1 but still finished seventh in the championship. Derek Bell only did a handful of races for Surtees but every time put up a strong showing in the car. His sports car commitments made it impossible for him to have a proper go at the championship which he so nearly won three years ago which is a pity. Colin Vandervell made the step up from F3 with a March-BMW run by Brian Lewis. The only performance that satisfied him was his second at Hockenheim with a works rebuilt engine. He went reasonably well in most of his other races but for such a highly principled man anything outside of the first couple of places was not good enough. He had many criticisms of the equipment he was given and this eventually led him to pack it in after Karlskoga.

Roger Williamson's terrible death in F1 was keenly felt in F2. At the start of the year with Tom Wheatcroft's GRD he was not too happy. But his determination won him through in that he won his heat at Thruxton and then led the final before having a pit stop. In the next few races he was always in the first six and challenging for higher before pit stops intervened. He was having to work unnecessarily hard to achieve those placings though and Wheatcroft bought him a March-BMW. In his first race he was walking away with his heat before the oil pressure went. Four days later on his first visit to Monza he was on pole position and despite Brambilla, V's effort he won both heats. The second was a classic Williamson drive. He was knocked off at the chicane on the first lap and re-started fast. His drive through the field showed every asset he had which would have made him a world champion—that he did not race in the championship again was cruel and the scene was never quite the same afterwards.

Tom Pryce graduated into F2 at Nivelles when Chris Meek bought him a ride with Rondel. He was lucky in that Meek also got a couple of good engines. Right from the start he adapted himself well and after a couple of races he was more often than not the fastest of all the Motul runners. He was certainly a popular addition to the circus and next year he must be a top championship

challenger. For Dave Morgan it was a season of disappointment. Ed Reeves provided him with a new Chevron and four David Wood engines but it was the latter which constantly let him down. Team manager Roy Forster left and after an engine failure on the warming up lap at Rouen Reeves withdrew. When Lotus wanted a second driver they picked Morgan but the troublesome cars hardly gave him a flying lap. Another person to give up early on was Canadian Dave McConnell who, armed with a Surtees TS15 which he ran privately, made a good impression in the first three races but then suddenly made up his mind in the middle of practice at the Ring to go back home. Why he didn't like European racing could never be understood because he was obviously quite talented. Wilson Fittipaldi drove the works Brabham after John Watson's F1 shunt but he never

Torsten Palm — Surtees.



seemed very interested in the project. The car lacked development and nobody really seemed inclined to do much about it.

F2 suffered another great loss when Gerry Birrell was killed at Rouen. Gerry had been in F2 for three seasons and had always been one of the leading competitors. This year promised to be his best. It was tragic that he should have been robbed of his first win in the formula at Thruxton when he drove quite exceptionally well before the works Chevron was involved in the silly accident which occurred at the chicane. Birrell, like Williamson, was one of the most popular drivers in F2 and was greatly missed.

Jean-Pierre Jaussaud scored just six points in the championship and really never looked like getting any more and it was difficult to think that the year before he had driven a supposedly difficult car, the Brabham BT36.

Colin Vandervell — March BMW





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to second place in the championship. He could never make up his mind about the Motul; one day he liked it the next he didn't. He has always been one to complain about his equipment but this year he did not even apply himself to make do with what he had and his great dream of getting into F1 now looks very remote. Peter Gethin only did a handful of races in his works Chevron and scored six points. He had engine problems at the start of the year but once this was sorted he took up his rightful place near the front and was unlucky not to have won at Karlskoga. Swede Gunnar Nilsson had a single drive in one of PR's GRDs and he took fourth place at the Norisring but this should not be taken as being particularly significant. Bill Gubelmann did the great majority of the championship races in his self financed March-BMW. Quite why the Formula Atlantic champion was not further up the grids was something of a mystery although when he had his engine rebuilt properly he moved up the field a great deal and towards the end of the year got some results for his persistence. Sten Gunnarsson had a rather frustrating year in the PR GRD team but he accepted all the engine failures with a smile and shrug of the shoulders. Once or twice he showed the form that served him well in a couple of races in 1971 and it could be that he still has something to offer.

Jean-Pierre Jabouille was once again number two to Patrick Depailler in the Elf team and he very much had to play the number two role and on a couple of occasions had to give up his car to Depailler. He certainly is not in the same class as his long time team-mate. He did show on occasions that he could turn it on and he went exceptionally well at Enna and quite well at Albi. Hans Stuck was given his works March ride by virtue of his BMW contacts and he certainly did not disappoint. He quickly adapted to different circuits and although he is very hard with the cars he is extremely quick. He will do a full season next year and will be a leading contender. Jean-Pierre Beltoise was surprisingly non-graded and Max Mosley quickly secured his services for F2 but it did not work out in that he had no luck. His engine blew in a big way at Mallory when leading and it was not until Pau that he was able to shine again. He made an early pit stop and lost many laps but after he resumed was undoubtedly the quickest man on the track. His only good result was a third at Albi.

John Watson only did a few races first with the works Brabham and then the works Chevron but was always quick and deserves a permanent ride. James Hunt and the Hesketh team made a big impression at Mallory with their Surtees TS15 which ran second for a while before breaking. Further troubles at the next few races, including strange attacks by buzzards in Germany and culminating in a practice shunt at Pau, resulted in the team going F1 which cannot be described as anything else but a masterstroke. Jody Scheckter was another of the aces who gave up F2 early on to concentrate and do better on other things. Brett Lunger was more involved in other things but when he brought out his own Chevron he never looked like setting the world alight as he was capable of doing in F5000. Andrea de Adamich and Rolf Stommelen did a couple of events each in the former's Fina Brabham and went well but were not serious F2 competitors.

Team Nippon was a GRS-run GRD set up for Hiroshi Kazato and Tetsu Ikuzawa. Kazato was extremely hairy on occasions and undoubtedly used more nosecones than anyone else during the year but he is quite quick. Ikuzawa was occasionally spurred on by his team-mate to floor the throttle but generally was not very competitive and he returned home after Mantorp. Arriving from Japan later on were Motohara Kurosawa (March-BMW) and Noritake Takahara (GRD). Both are top sports car men and Kurosawa in his five races did fairly well while Takahara certainly did all that was expected of him in his single outing.

One impressive newcomer was Bertil Roos who was the first person to drive the DART



Bertil Roos — GRD.

GRD when Fred Opert hired it for the Swedish fortnight. Roos has his own brand of confidence and is without doubt a prospect for the future. The Hart engine which Opert brought along also showed that it was all the chassis was really lacking and his efforts at Karlskoga were tremendous. Another Swede to go well was Torsten Palm who bought a



Tom Pryce earned the Grovewood Award for his F2 performances

ride in the Surtees team. He corners very much like a rally man and had an inexplicable accident at Mantorp near the end but he made amends with a fiery drive at Karlskoga. Andy Sutcliffe had just one F2 outing in a Brian Lewis March at Karlskoga. He put it on the second row of the grid and finished third in his heat which was very promising. However there were problems sponsorship-wise and no more drives materialised. Jose Dolhem only managed a couple of outings when he hired a Surtees and none was very successful; at Rouen he crashed and at Albi he had a misfire throughout the race.

Brendan McInerney moved out of F3 into F2 with a GRD and always liked driving the car. He never really featured but was not expected to—without his company though and those other enthusiasts like him, grids would have been very, very thin at times. John Wingfield was one who fell into that category with his Brabham which he pedalled steadily until he decided it was too expensive. Numerous Swiss amateurs turned up on odd occasions and we were treated to the sights of Jo Vonlanthen's GRD doing odd things on occasions, Roland Salomon's GRD going quite quickly sometimes, Paul Keller struggling with a March 722, Georges Schaefer struggling even harder with an ex-works Pygmy and Roland Binder (March-BMW) actually lapping without a misfire on occasions.

Italy produced such notables as Shangry La in his Surtees TS10, Ettore Ricci in an ex-Brambilla March 712 which fell apart and Spartaco Dini in a BT40 which he used to view the Enna countryside. Gabriel Serblin was a slightly more serious competitor in the Fina Brabham but found being able to see all four wheels turning a trifle off-putting and went back to sports cars. Lichtenstein's other racing driver, Manfred Schurti, had a couple of outings in the interim Royale; the first was quite promising at Nivelles until the engine broke; the second at Mantorp ended up in the weeds in practice. Claude Bourgoignie preferred hillclimbing his GRD to circuit use and did not feature in his two events nor did Patrick Dal Bo in his father's Pygmy. Tom Walkinshaw did one event with his troublesome GRD at Thruxton while John Lepp did one race at Mallory in his Atlantic

Chevron and scored points. Robert Salisbury's dual purpose Gerard Surtees had little joy in F2 or FA while hillclimber Bob Marsland started one event and scored a point.

GRADED DRIVERS

For all the money that they commanded the graded drivers could hardly claim to have justified their existence in F2 this year. It must be admitted that Henri Pescarolo (Thruxton/Motul), Reine Wisell (Nurburgring/GRD), Francois Cevert (Pau/Elf) and Tim Schenken (Norisring/Elf) did score wins. Schenken in fact did have some reasonable placings throughout but Wisell's performances and attitude were hardly those of an ex-Grand Prix driver. Cevert won on his only F2 outing while Mike Hailwood and Carlos Pace showed what they were capable of in their four outings although with the exception of Hailwood's second at Mallory and Pace's fourth at Salzburg did not get any results. Ronnie Peterson tried as hard as ever with the Texaco-Lotus but could not be expected

to achieve miracles. Emerson Fittipaldi realised this early on and used his damaged foot as a good excuse not to drive the car.

THE FUTURE

At the time of writing the future of Formula 2 was being discussed in Paris and it is to be hoped that a proper decision can be reached.

It is imperative that F2 continues as it is the major proving ground for up and coming drivers—not only do they compete against established drivers but they get much needed European racing experience. In all probabilities the decisions taken in Paris concerning next season will be a compromise. Let's hope that it is acceptable and will accord the formula a reasonably healthy existence next season. However, instead of waiting to compromise again for 1975 the time is ripe for discussion on turning F2 into something concrete and meaningful in the years after F2 is a European formula—there is a strong accent on European engines, drivers and circuits and if it were given the proper footing it should become an alternative for those countries unable to afford Grands Prix or for those in a more healthy state a second major meeting. One thing though that must be tightened up is the state of some of the circuits which the formula visits. This year for instance both Rouen and Mantorp Park were quite unacceptable on safety grounds.

Jarier uses a basket to collect his silverware!





Against the picturesque setting of Sweden's Anderstorp Park, Jariir's March leads the assorted makes of Chevron, Elf, Surtees and Rondel the main contenders in the 1973 series.

1973 EUROPEAN CHAMPIONSHIP FOR FORMULA 1 DRIVERS—POINTS IN DETAIL																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTAL
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	J. P. Jarier																78
2	J. Mass																41
3	P. Depolier																38
4	V. Brambila																35
5	J. Coulson																32
6	B. Wolff																29
7	M. Beutler																29
8	D. Bell																23
9	E. Vandervort																13
10	R. W. Anderson																12
11	T. Pryce																11
12	O. Morgan																8
13	D. M. Connolly																6
14	P. Gethin																6
15	G. Milson																6
16	W. Fittipaldi																6
17	J. P. Jussé																6
18	S. Gunnarsson																5
19	W. Gubermann																5
20	R. Binder																5
21	G. B. Smith																5
22	J. Walgren																4
23	J. P. Belloc																4
24	J. Von Arnim																4
25	H. Kato																4
26	H. Dalqvist																4
27	J. Lepp																3
28	S. Moser																3
29	J. P. Jabouille																3
30	R. Scott																2
31	D. N.																2
32	B. Lunger																2
33	R. S. Shury																1
34	G. Serban																1
35	B. Marland																1
36	K. Rieder																1
37	T. Palm																1
X	Participation in a non-basic event for which the driver did not get any points																0
(1)	Points between (1) are not taken into consideration																
P	Basic event																
NP	Non basic event																

UDT World Cup Rally regs

—few special stages but severity promised

The official regulations for the 1974 UDT World Cup Rally became available just as we closed for press. The provisional programme is as follows: March 1, final closing date for individual entries and private owner documentary proof; April 1, final date for team entries; May 4 from 10am at National Car Parks, Semley Place, London, examination of vehicles and documentation. Cars will then be in Park Farm overnight. May 5, drivers' briefing and last-minute instructions. Cars will then depart in convoy to Wembley Stadium for the 12.01 start. There will be a special stage in southern England on the route to Southampton. From La Havre on May 6 the cars are scheduled to visit Lisbon, Algiers, Tangiers, Kano, Tunis, Izmir, Moscow and Prague on their 20-day gruelling trek to Munich where the first

cars are expected on May 25

A brief look through the booklet reveals that cars will be divided into engine capacity classes as follows: Class 1—1300 cc or less; Class 2—1301–2000 cc; Class 3—2001 cc or greater; Class 4—any vehicle with four-wheel-drive capability.

The route will be divided into sections by time controls at which competitors will be required to report at their scheduled time shown in the road book. There will be some special stages but any directional arrows displayed on the route will, the organisers stress, be supplementary aids without mandatory authority.

In addition to the normal vehicle eligibility certain items will have to be carried including a suitable magnetic compass, distress flares, three gallons of water per crew member, three

days' minimum survival rations, and a 5 kg capacity (minimum) fire extinguisher. The rally is open to four-wheel passenger vehicles to any specification.

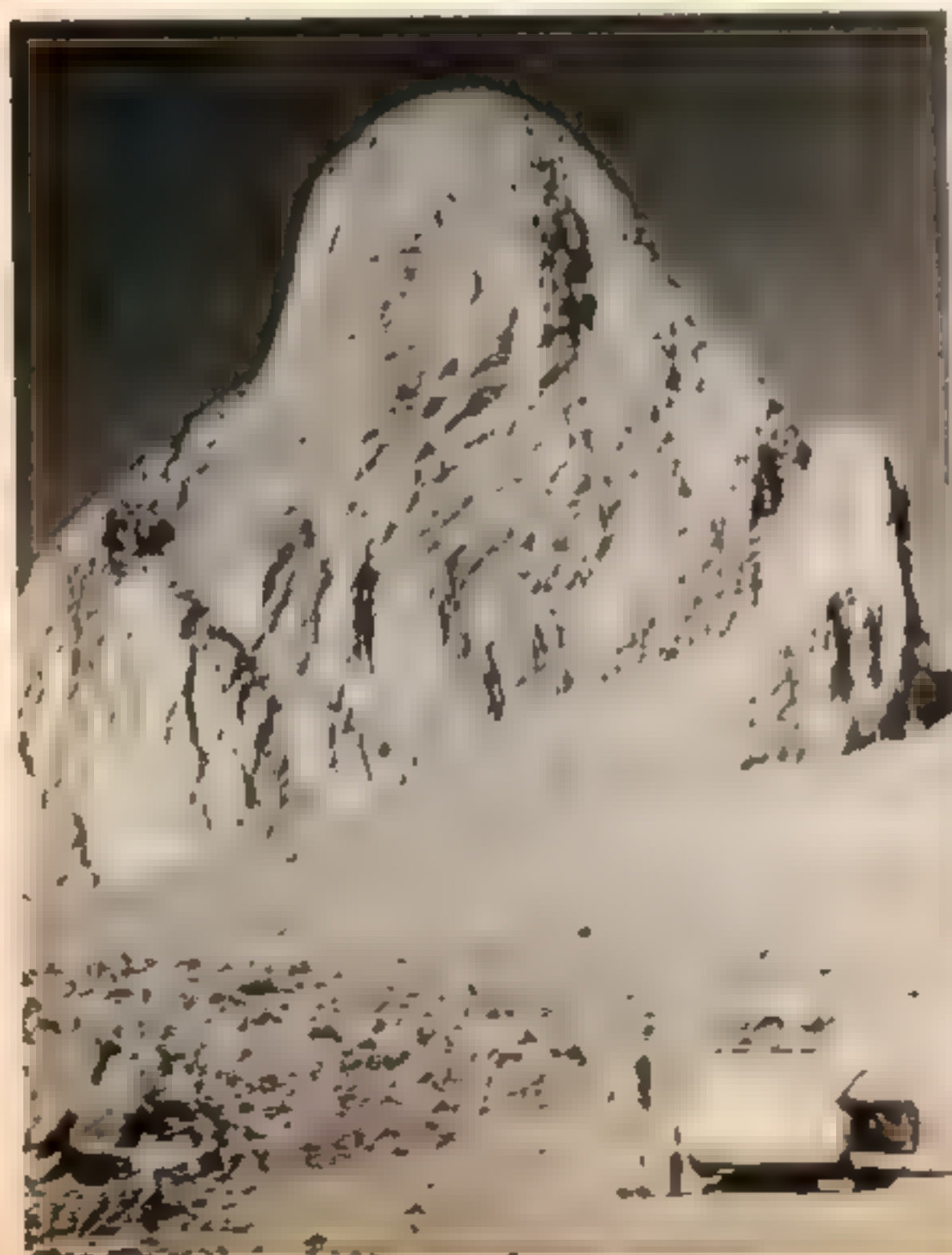
One fact emerging immediately is that there will be very few special stages. Tony Ambrose, Director of the Rally, counters this criticism with the remark that with one killing road section following another, the leader on the road at Kano or Tunis will be the leader of the rally in the best traditions of the old classics. Organised by the RAC in conjunction with UDT, applications for entries must be addressed to the Administration Office, UDT World Cup Rally 1974, PO Box 6, London, SW1W 9EX, together with an entry fee of £650 per car plus an additional £125 for each additional crew member over two. The list opens on January 2 and will close on March 1.

Firestone 'on'

The organisers of the Firestone Rally are confident that the Eighth International Firestone Rally will take place over March 29, 30 and 31 as planned, starting as usual from Bilbao. The route will total just over 1500 kms with 29 special stages making up 462 kms. Four stages are to be run four times each, three stages three times each, one stage is run twice and the last stage in each part of the rally is run only once, making practice and pace notes an easier job. Entries will be accepted up to March 28 with a fee of 4000 pesetas covering insurance and hotel accommodation in Bilbao from the day before the rally to the morning after. Accommodation for the seven hour halt in Santander is also included. First prize will be two hundred thousand pesetas with prize money in all totalling in excess of one million pesetas. The organisers are hopeful of enticing a British contingent to equal or better last year's successes when Chris Sclater finished fourth with Harold Morley, Jack Tordoff, Ian Lawless, Jon Lipton, Chris Lovell and David Skinner all finishing the event.

UDT WORLD CUP RALLY 1974

The road here goes round rather than over this large prominence in North Africa.



RAC Rally coverage minimal

Looking back on the RAC Rally and the publicity it received during the time it was running, we have checked out four national daily papers for their reports on Monday, November 19 (the day after the first overnight halt), and our findings are pretty grim. The major rally sponsor, The Daily Mirror, as expected did best by far, producing a report of 10½ in with placings, a good photograph and a large eye-catching headline "Timo stays ahead." The Times progress report of the rally on Monday measured three column inches. Headlined "Makinen of Finland leads in rally" the report, minuscule as it was, managed to be accurate and Bjorn Waldegaard—the only other competitor mentioned apart from Makinen, Clark and Pat Moss-Carlsson—had his

name spelled correctly. Monday's Telegraph managed to work-up a little more enthusiasm (or had less news perhaps) and managed nearly seven column inches headlined "Flying Finn leads in RAC Rally." The top three placings were given and these were also the only three crews featured in the story. Last, and in this context least, came the Daily Express—sponsors of major races and the 1968 London to Sydney Marathon. The Express managed only two and a half inches headlined "Timo leads in a Ford." The Express mentioned Makinen, Waldegaard and Clark only and slipped slightly with their spelling in stating that Timo Makinen's "partner" was "Englishman Harry Ladden."

Mintex Dales postponed until mid May

The Mintex Dales Rally organised by the De Lacy Motor Club has been postponed from February 23/24 to May 18/19 owing to the fuel crisis. The Mintex Dales,

with extra forest mileage for next year, will be a qualifying event for both the RAC Rally Championship and the CASTROL/AUTOSPORT series.

Last year's Dales winner Roger Clark in Dalby Forest





Steering is direct giving instant dodging round flower beds and trees

CHRISTMAS ROAD TEST

The mighty Lawnbug turns the chores into good fun

The Lawnbug can tow a trailer or leaf-sweeper



I'm sure many AUTOSPORT readers have lawns, paddocks or orchards which need a lot of keeping tidy. For the very wealthy, it's simply a case of telling one of the gardeners to look after it, or perhaps they telephone a horticultural contractor. For most of us, however, it's just another week-end job that takes hours and hours and can entail walking quite a few miles.

Walking is jolly health-giving and promotes a splendid thirst, but you can have too much of a good thing. Personally, I once calculated that I had walked 16 miles in a day behind a mower, so I acquired one of those dignified dark green machines which elderly gardeners, sitting on trailer seats, drive gently round the rolling turf of stately homes. At least you sit down to the job and the result is superb, but it can only cope with the smoother of swards and you rupture yourself heaving it backwards after you have emptied the grassbox.

So, I decided to buy a ride-on mower that could also tow a trailer or a leaf-sweeper. If I had needed to pull really heavy loads, I would have had a miniature tractor with hefty rear tyres, but I preferred a lighter machine for my work because it would mark the lawns less. Above all, I wanted a really low-built vehicle that could dodge under tree branches hanging near the ground, when mowing in the woods.

As soon as I saw the Lawnbug, I realised that my search was over. It looked like a tiny single-seater racer and people sometimes mistake it for a kart at first sight. A demonstration by my friendly Lawnbug dealer, Mr Bray of Hookwood Common, Horley, convinced me, and I had the fun of choosing the specification. There are 5 hp and 6 hp models, but for me only the 5 hp engine would do. The most important extra was the electric starter, which costs a cool £45 with its battery but is worth much more.

Some of the most miserable half-hours of my life have been spent trying to start motor mowers. Scorched by the pitiless sun, I have pulled on that revolting string again and again. The Lawnbug starts the engine so fast that it dare not resist and, if it did, a pair of jumper leads to the car battery

Road test



Above: It looks like a tiny racer. Below: 2 ft horizontal cutting blade

would suffice. Civilisation means different things to many people, but to me its a motor mower that starts at the touch of a button

The basis of the machine is a steel chassis that might well be called a monocoque. There is no suspension because all four corners must be kept a constant distance from the ground or the blade would dig into the grass too deeply. The steering is direct, with no reduction gearing, and handlebars are used instead of a wheel, to give instant dodging round flower beds and trees. The rear wheels are driven from a combined 3-speed gearbox and differential, which carries the single disc brake. All moving parts are safely enclosed

Nobody would deny that the best small engines are made in America. This one, a Tecumseh, has a horizontal cylinder with forced air cooling and a vertical crankshaft. This unusual arrangement allows a direct belt drive by pulleys to the 2 ft horizontal cutting blade, the vertical shaft of which is moved by a lever to tighten the V-belt, starting or stopping the mowing. A longer belt runs from the engine to the gearbox and is tensioned by a jockey pulley. Gentle pressure on the right pedal tightens the belt and sets the vehicle in motion, if a gear has previously been engaged.

This is a splendid arrangement because, should the driver be swept off his machine

by a tree branch or nod off after too many cooling draughts, the Lawnbug will stop and wait for him to remount. The powerful disc brake is commanded by the left foot and the throttle is controlled by a lever on the handlebars—with the giant 8 hp engine it need never be opened very far. The unusual location of the controls is a bit confusing and though I seldom forget in the garden, I often have an accident when parking in the potting shed, sending forks, spades and hoes tumbling in noisy confusion, but the Lawnbug is too tough to dent.

This is just as well, for guests find the little machine irresistible, particularly after the brandy and coffee stage has been reached. It is used for many errands, such as collecting the milk or the papers, and once I have found the correct category under which it may be taxed, you will see it parked outside the local. The steering is delightfully quick and as one corners on the drive in a spray of gravel, the understeer is most noticeable.

The performance is limited by the low gearing, which is just right for garden and farm use. With the 8 hp engine, a top gear start can momentarily lift the front wheels if the pedal is stamped upon. However, its fun to start on second and snatch top, because the gearchange is excellent. The low bottom gear permits tough old tussocks of grass to

be cut in neglected pastures and for this purpose a distance piece can be removed to raise the knife from its normal setting. It would be easy to fit different pulleys to increase the speed and of course short bursts are possible at speeds considerably higher than those indicated on the data panel.

Road test vehicles are normally lent to me by manufacturers, but on this occasion I have tested a machine for which I paid the full price over the counter. I have spent many happy hours driving it during the past season and it has had to work very hard indeed. There has been no problem or claim under warranty, and the sole adjustment I had to make was to tighten the bolt holding the driving pulley of the cutter. A dab of Loctite—that invaluable specific—prevented a recurrence.

When there's no more grass cutting to be done, there's always the leaf sweeper to pull, or a load of logs to be fetched in the trailer. The Lawnbug's work is never done and I wonder how I ever managed without it. This is a Christmas road test and I have no wish to mention the problems that beset us every day. However, perhaps I might remark that the petrol consumption is incredibly little—not noticeably more than that of a medium-sized walking mower and far less than the thirst of my big roller and grassbox machine. Sorry, but I've never worked out the mpg!

The Lawnbug is a ride-on mower that can also pull light loads. For heavier towing you can get a miniature tractor, if you can afford it.

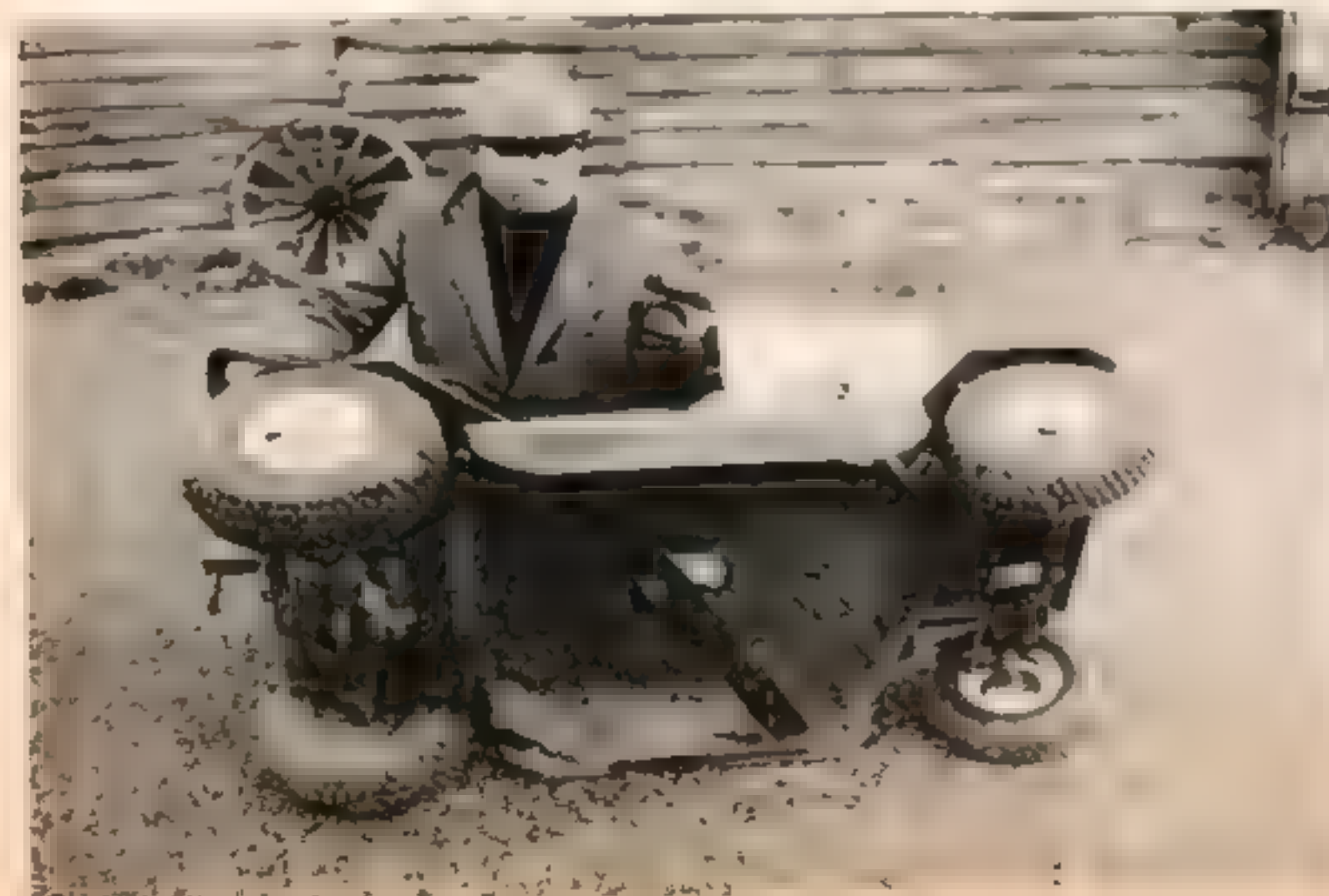
The machine is very quiet, which appeals to the neighbours and though the single-cylinder engine is solidly mounted, the vibration is not very noticeable. It idles smoothly, trembles a bit at medium revs, and then becomes almost vibrationless near the top of its normal range. With a weight of only 2 cwt, it fairly leaps away at a touch of the throttle; it's such fun to drive that everybody wants to have a go and there are no cops with breathalysers in my garden.

CHRISTMAS ROAD TEST
SPECIFICATION AND PERFORMANCE DATA

SPECIFICATION AND PERFORMANCE DATA

Vehicle tested Camaro V-6 HE 1970 2+2 n/wr pers
2 1/2 ft rear wheel base 84 1/2 (Cheaper Model)
1 m l 1 Mile W/T in 1 hour
Eng no 2 1/2 inch 4 MBG 2 + On end single cylinder 7 7/8
n - 2 1/4 3/4 mm (3 5 1/2) I mpress on ramp 4 1/2 to 1
7 3/4 x 4 1/4 M = 20 at 1 bu stop
Transmission P-man drive by belt driving at clutch
on a 2 to 1 1/2 rd consists each gear and back
gear and 4 forward ratios 1 1 1/2 & 2 1/2 to 1
Ratio so 1 1/2 n 1
Chassis 1 1/2 year steel monocoque, rust proofed with
E-powder paint and cladding Mad shd also nu
L i b 2 Steel wheels fitted 1 1/2 x 4 DO= front and
1 1/2 x 5 1/2= rear ty es
Equipment 1 n gray color with V bottom clutch drive
steering rack
Dimensions Wheel base 3 ft 1 1/4 n Track 1 ft 10 1/2 n
1 - 1 1/2 ft 1 1/2 in rear Overhang 4 ft 2 n
W d h 2 ft 8 t Weight 2 cwt
Performance Maximum speed 8 mph Speed in gears
3rd and 4th max first 2 mph Acceleration 0-6 mph
1 1/2 s.

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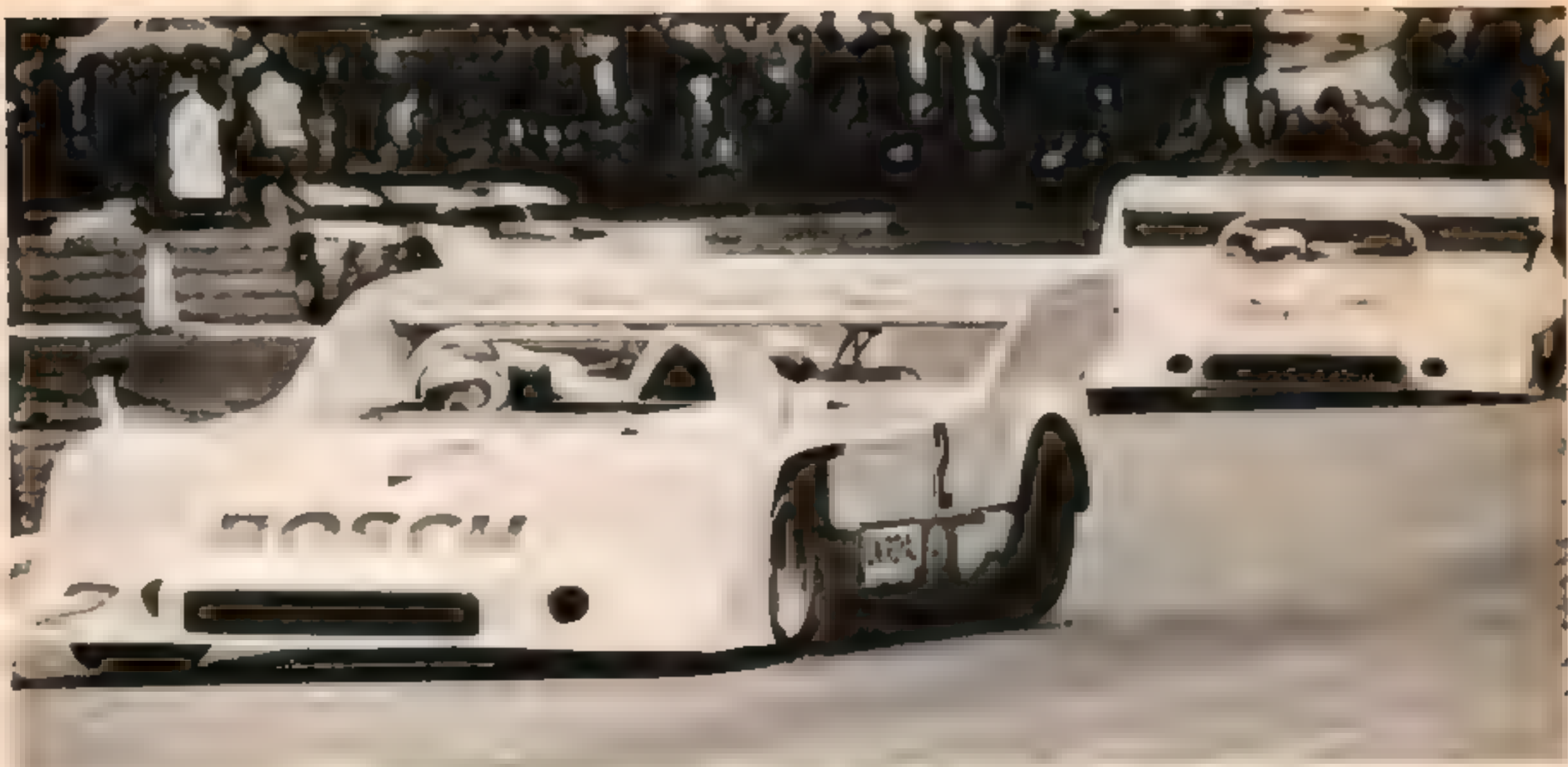
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A Happy Christmas to all



The performance of turbocharged engines in racing is well known. Porsche 917, 5.4-litres 630 bhp at 8300 rpm. 1100 bhp blown at 7800 rpm.

Turbocharging—its uses

By JOHN BOLSTER

The supercharger was first applied to huge stationary gas engines around the turn of the century. These were of the type having producer gas plants consuming charcoal, sawdust, or anthracite as fuel. To suck air through this apparatus greatly impeded the breathing of an engine and so it was customary to pressurise the system with a Roots-type blower, driven by a belt from the crankshaft.

Various attempts were made to supercharge car engines, notably by Chadwick in America, and Hispano-Suiza built a supercharged racing engine but the first war stopped its development. Nevertheless, the idea was applied to aircraft engines during that conflict, for increasing the altitude of flight; by forcing a denser charge of air into the engine, the power loss occasioned by the rarefied atmosphere at great heights could be reduced.

After the war, Mercedes applied the supercharger to their production cars. The Roots-type blower was driven by gears from the crankshaft, with a cone clutch interposed by pressing the accelerator pedal past the normal flat-out position, the blower was engaged and forced air into the carburettor. Though the gears and supercharger combined to give a high scream, it was a most inspiring sound which I shall never forget.

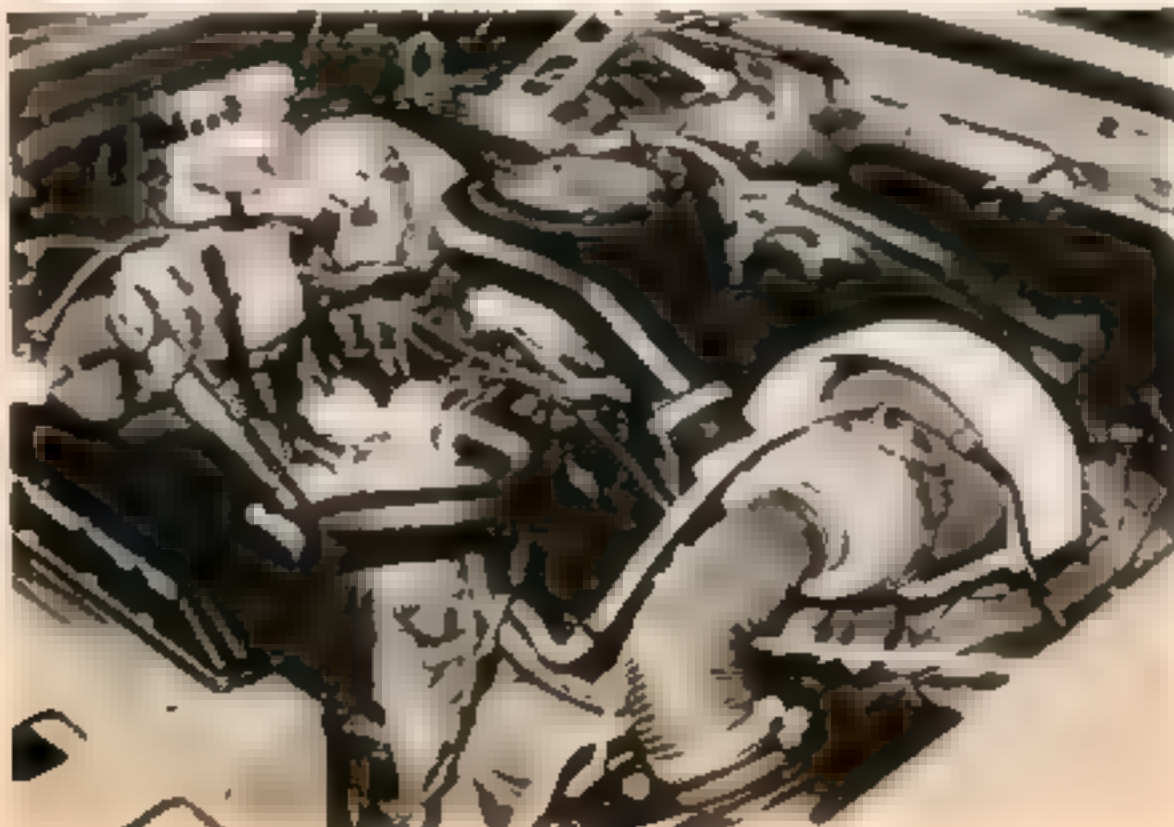
Thereafter, the engine-driven supercharger was fitted to almost all successful racing cars for many years. When Sunbeam mounted the carburettor before the blower, the cooling effect of the fuel passing over the rotors greatly increased efficiency, especially as clearances could be reduced at the lower resulting temperatures. This was particularly the case when alcohol fuels were used, the internal cooling of the supercharger, induction pipe, and the

engine itself, giving a vast power increase. In the nineteen-thirties, supercharged engines running on methanol were developing more than 200 bhp per litre.

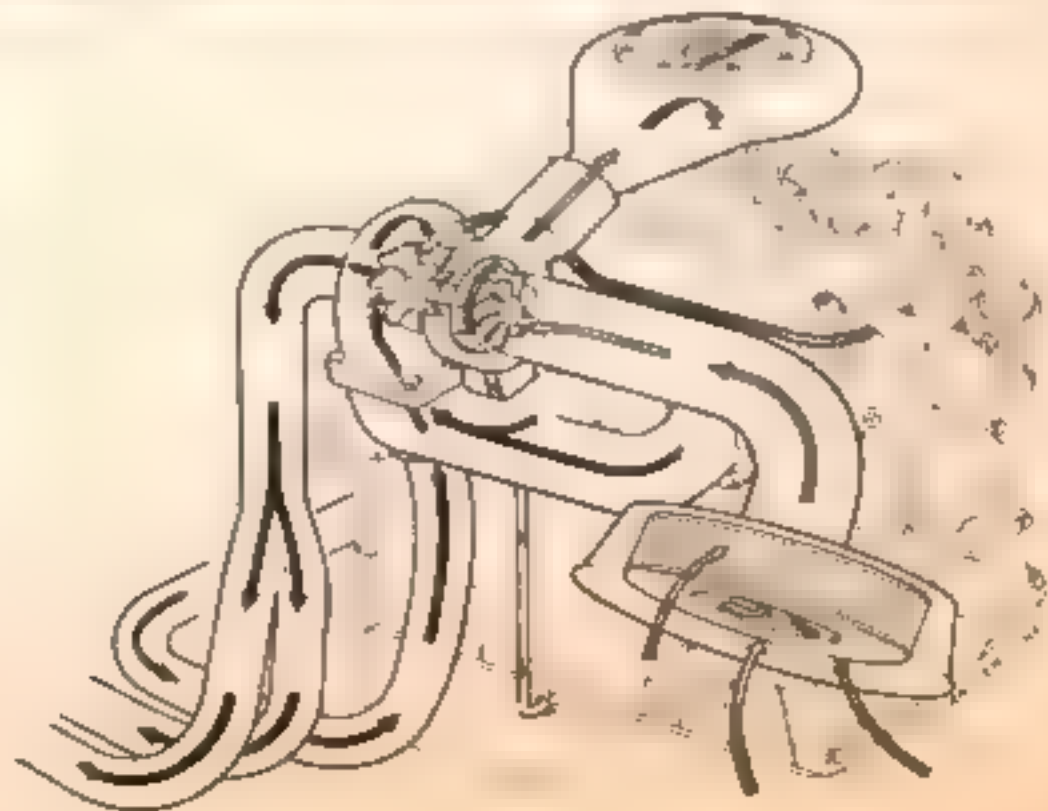
The supercharger of a grand prix engine could require well over 100 bhp to drive at peak revs. This meant that an engine producing 450 bhp at the flywheel was actually generating some 550 bhp by the time it had supercharged itself. In other words, it consumed enough fuel to develop 550 bhp while providing 450 bhp to propel the car.

It was for this reason that the many supercharged cars which came on the market were soon removed from the catalogues. They used so much petrol that their owners soon took off the blower and hung on a couple of the good old SU carburettors. In the case of a very inefficient engine, such as a side-valve with small and tortuous ports, a spot of supercharging made a tremendous difference. As engines became more efficient, however, the gain obtainable from forced induction was very much less. On methanol, a high boost could be used, but with petrol the lack of internal cooling severely limited the blower pressure and even then the static compression ratio had to be reduced if the engine were

Experimental Ford 3-litre turbocharged engine



Air research system gives 184 bhp and 215 lb ft torque at present.



to stay in one place. If the supercharger only consumed 10 bhp, that power had to be produced before the engine equalled its unblown performance, so a higher fuel consumption was inevitable.

Yet, all the while, an immense source of energy was going to waste. Extremely hot gases were coursing through the exhaust pipe, doing no good to anybody except the manufacturers of exhaust systems. The short life of exhaust pipes and silencers has been one of the most expensive shortcomings of modern cars.

The exhaust-driven turbine is the ideal power source for driving a supercharger. It uses the power in the exhaust gases and in so doing it extracts the heat and pulsations. Only a very small silencer is required to give a remarkably quiet exhaust note. Best of all, the turbine prefers to run at extremely high speeds, which suits the centrifugal supercharger. The centrifugal blower is far more efficient than the low-speed types, besides being smaller, cheaper, and virtually immune from wear. It is very difficult to arrange a satisfactory geared-up drive from the crankshaft, but by coupling this type of supercharger directly to the turbine, a neat little self-contained unit is the result.

Commercially, the Turbocharger is used on diesel engines for lorries and trains, among many other applications. Because the power driving it would normally go to waste, this really is the almost unique case of getting something for nothing! Another advantage is the possibility of using a smaller engine, thus saving valuable space and weight. Diesel engines with very large cylinders are particularly difficult to silence and the turbocharger helps here in two ways. It permits smaller cylinders to be used and eliminates much of the noise virtually at source; exhaust pipes vibrate less, run cooler, and carry smaller silencers.

When turbocharging was first used on diesel lorries, there was a tendency for black exhaust to be emitted momentarily because full injection took place before the blower had reached its normal working speed. A more sophisticated control of the pump delivery has cured that one. I have driven a huge V8 Scania, in which the driving compartment is directly above the enormous diesel engine, and I can state that one simply does not notice the sound of the turbocharger. Furthermore, turbocharged engines usually run at lower revs than their unblown equivalents and their increased torque means less gearchanging, both of which attributes should reduce the intolerably high noise level which is the cause of too many trucks.

The spectacular performance of turbocharged engines in racing is well known. For example, the Porsche 917 flat-12 engine of 5.4 litres capacity develops 830 bhp at 8300 rpm unblown or 1100 bhp with a lower crankshaft speed of 7800 rpm when boosted at 20.3 lb sq in. Engines of over a thousand horsepower are not the concern of this particular article, however, so let's get down to production cars.

Turbocharged engines can assist the designer of high performance cars, because they can be lighter and smaller for the same power output. The principle is also applicable to the luxury car, for a low-compression engine with ideal city manners can instantly become a high-compression road burner. The greater the boost the higher the effective compression ratio, with the improved performance and fuel economy which that entails. There is little doubt that the exhaust driven supercharger has an important part to play in the reduction of pollution, but though research is no doubt taking place, no authoritative results have yet been published.

At the present moment, fuel economy is our main interest and it is here that the principle can make its greatest contribution. Every car on the road is wasting much of its fuel in the form of hot gases which are nothing but an embarrassment. In the days of the steam engine, this problem was resolved by adding a larger, low-pressure cylinder to extract further power from the hitherto wasted steam by compound working. The patent files are full of ideas for compound internal combustion engines, many of which



An Imp engine turbocharged by Minnow. Unit installed here in a Davrian

had exhaust-driven turbines contributing to the power of the crankshaft. However, the extremely high speed of a turbine calls for elaborate reduction gears, resulting in a costly and bulky installation.

To drive a centrifugal blower directly from the turbine at once deletes all the transmission gears, the power being contributed to the crankshaft by boosting the existing engine. Provided that the boost pressure and the compression ratio are adjusted to keep below the detonation line, the mechanical loading of the engine is not increased. This is because inertia forces are more destructive than explosion pressures in an engine running at maximum revs. Heat loading, on the other hand, is increased unless alcohol fuels are used, which may entail some attention to exhaust valve and piston cooling, for example, but this would be taken care of at the design stage.

I do not advocate the turbocharger as a bolt-on-accessory, though no doubt it could be used to increase the performance of an existing car as long as the boost was suitably restricted below piston-burning levels. What I do suggest is the design, *ab initio*, of a new small engine to give 60 mpg motoring along with an acceptable performance. Though the present fuel shortage may be temporary, there is unfortunately no doubt that petrol will become more and more expensive. The design of engines to make the best use of it is therefore something which all manufacturers should tackle as a long-term project.

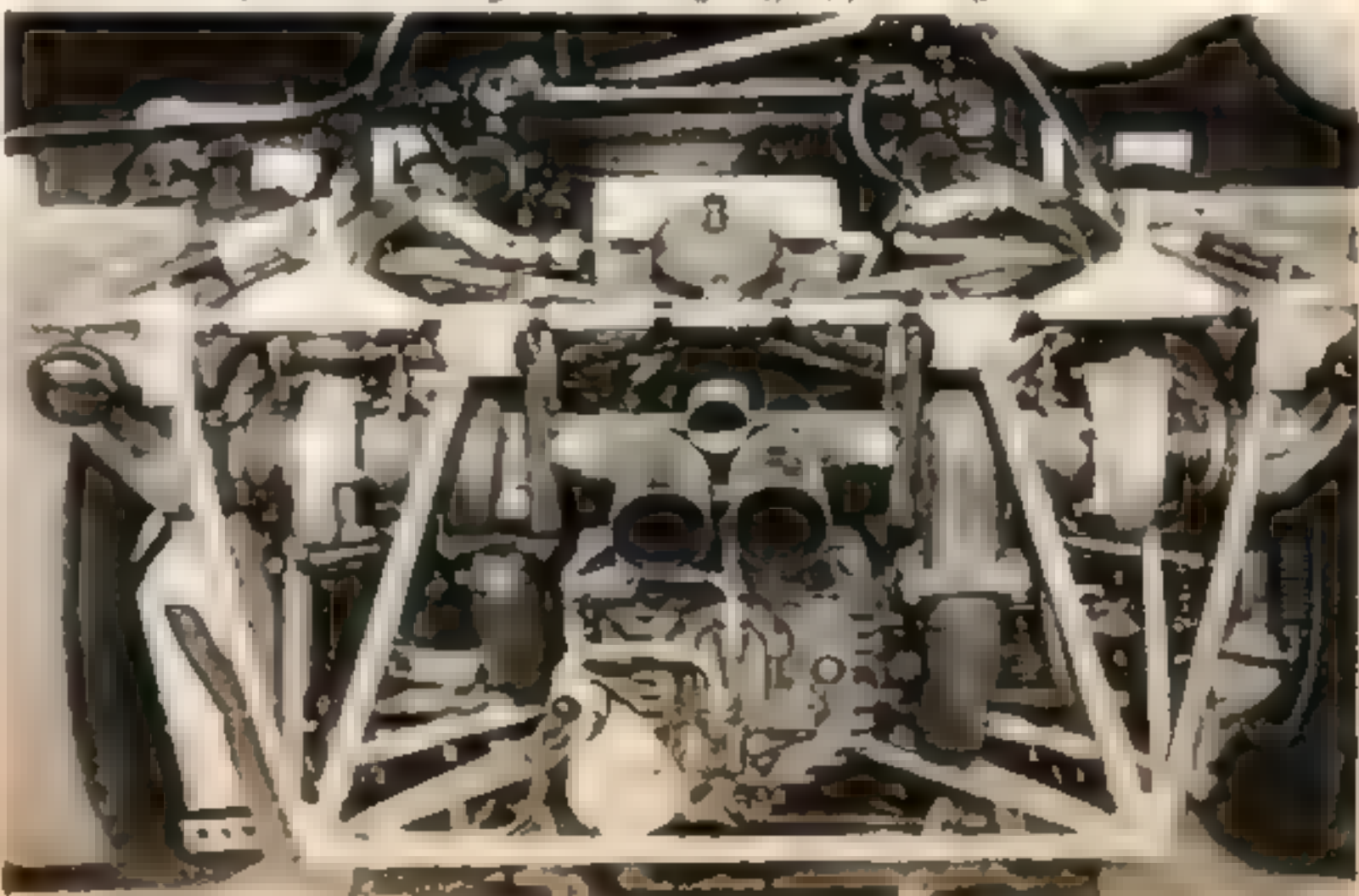
What we are going to need is a smaller-engined car than anything the British manu-

facturers are at present turning out. I would suggest a 500 cc two-seater and a 750 cc four-seater for example. There are many good reasons for using a two-cylinder engine, such as the difficulty of achieving acceptable pollution standards with four very small cylinders. Because the power unit would peak at relatively low revs, the construction could be simple and cheap.

By manipulating figures obtained from turbocharged engines used for many purposes, it is possible to make an inspired guess at the sort of performance which would be available. It is my conclusion that a very small car with an average consumption of 60 mpg could be developed to give the sort of speed and acceleration that one gets nowadays from a 1300 cc saloon. In our impoverished state, perhaps we should be grateful for so much, but it would be abundantly worth while to make use of all that potential power which is at present going to waste out of our exhaust pipes.

There remains the problem of the slight delay which may occur in throttle response while the blower is reaching its working speed. This was noticeable in a turbocharged Corvair, which I drove several years ago, but could be forgotten on the big Scania. No doubt it has to be considered by drivers of 1100 bhp Porsches but I don't think it would be of any consequence on the low-powered cars which I have been discussing. In any case, the turbochargers used hitherto have mostly been adapted diesel units and unnecessarily heavy for car work. With reduced size and a lower spinning weight, the response should be pretty rapid.

The Porsche 917, rear view showing the turbochargers of the flat-12 engine





Right to left Gary Street, Peter Warren, John Welch and Trevor Hopkins adopt differing lines at Chessons on the first lap of their third run

LYDDEN

The Jesty/Taylor show

For the benefit of viewers of last Saturday's World of Sport on ITV, 21 drivers took part in a Rallycross at Lydden Hill the previous Wednesday to decide the first of the three round Philips Electrical Trophy. Winner on the aggregate of two rounds out of three, three lap races was Nick Jesty from John Taylor, who finished one-two on the tally of races won against one another. These two were nearly 18 s over the next man, Hugh Wheldon in another Mini, while other well-known names were Gary Street (fourth), Rod Chapman (fifth), Peter Warren's St Bruno rally Escort (sixth) and Bernard Rodemark (seventh). By the time the final round came up, which had nothing to do with the Philips Electrical Trophy and didn't appear to count for anything nor used on TV, the track had changed from fairly hard, frosty and icy, to mud, which often slowed the cars coming into Chessons, and prevented windscreen wipers doing much work as it was so thick. As Taylor won this final round of the fastest six, he considered himself the winner, being especially pleased as an Escort hadn't won before in such mud.

The original entry was to have consisted of a class for RAC rally cars but probably because the rally was a few weeks ago, only one vaguely rally car turned up in the form of Warren's Escort, while disappointing non-starters were the de Rooy brothers. Both Ron Douglas' and Rod Chapman's Escorts had engine fires during practice but appeared for the racing.

Race one, in glorious sunshine, saw a good dice between John Button's 2.0 VW and Paul Northall's 2.0 GT6, both cars leading at some time but victory ultimately going to Button in 3 m 16.4 s. Vim Luitjbrechts' 3.5 Rover-engined Marina was the only other car to finish having had trouble seeing through the mud. Peter Warren put in a smooth run in the second race to win in 3 m 19.2 s from Wheldon who closed and then fell back to a 3 m 29 s, in close company with Deryck Satterley's Mini. John Taylor lost an early

challenger in the next race when David Angel quickly retired the Mini with engine bothers and Taylor took off to record the fastest run of the day on the hard surface, a 3 m 0.4 s. Both Gary Street (Mini) and Trevor Hopkins (1.8 Escort) had eventful runs behind the flying Haynes of Maldstone car, Hopkins taking a 3 m 27 s with Street 11.4 s behind after two spins.

Behind Nick Jesty (Mini) there was considerable activity in the final first round run, for while Jesty flew round to his fastest run of the day, 0.3 s behind Taylor at 3 m 04.2 s, Rod Chapman was providing much amusement flying off all round the track, ultimately to retire. An erratic Peter Vaughan (Mini) did likewise, and although Bernard Rodemark (Mini) wasn't exactly angelic, it was he who finished second, over 25 s away.

Paul Northall's GT6 took an early lead in the first race of the second runs, but at Chessons the second time round, Gary Street got through as the GT6 sought traction on the increasingly sticky surface. Both Geoff Crabtree (VW) and 18-year-old Mexico pilot Mike Smith (Stormont Escort) had spun out of the hunt, so it was Luitjbrechts who took the slowing Northall for second, 10.6 s behind Street's 3 m 22.4 s. The next lot were all over the place, with first Trevor Hopkins (Escort) leading until he went off, and Deryck Satterley had a leisurely inversion at Chessons, so by lap two it was Bernard Rodemark leading from Hopkins and John Welch, while Ron Douglas called it a day after one lap and no vision. Rodemark won on 3 m 22.6 s with Hopkins over 10 s behind. The next race saw Jesty taking that all important time lead from Taylor by leading at the start, all the way to the flag, with Taylor dropping behind, Jesty winning on 3 m 7.8 s to Taylor's 3 m 11.8 s despite an error at Chessons. Wheldon's third place was perhaps overshadowed as he did his best time of 3 m 17 s. Final second run race was a Rod Chapman benefit despite a slippery moment at Pitts, finishing in a 3 m 16 s. Both

his adversaries had a difficult time, John Smith's Escort still not finishing a race, and Peter Bryant's Imp posting the first over 4 m run.

The final runs saw Street recording his fastest run with a competitive run in the company of Hopkins, Welch, Warren and Rodemark. Street led the first lap until the hairpin where Welch slipped through with a well timed manoeuvre. However, he messed it up at Chessons so it was Street who finished in 3 m 22.2 s while Hopkins disposed of Warren to come second, 4.6 s behind with Warren next from Rodemark.

Once again Jesty and Taylor were together on the muddy track, and it was up to Taylor to revenge his previous defeat by 4.2 s. At first it looked as though Taylor was never even going to get in the leading position as Jesty sped round just ahead of the Escort but by lap three he was in the lead, although never by more than 2.4 s, so victory was Jesty's. Paul Northall initially took up the chase but became more and more bogged down in the mud, and after Button's VW spun on the last lap at Pitts, it was Rod Chapman on 3 m 33.4 s, 15.8 s behind the flying leading duo. If Wheldon had produced the same sort of form as he did in his final round earlier in the runs, he would have been closer up with the leaders, for despite getting well into the mud twice, it was he who took victory, leading throughout and winning by 5 s on 3 m 20 s from John Smith's Escort having its first finish and a good time.

A final, possibly for the benefit of TV, for the fastest six saw a good start by Jesty, but by Chessons Taylor was in the lead and he drew out to win by a margin he would have found useful earlier on, 6.2 s on 3 m 12.2 s. Jesty seemed to get more sideways at Chessons and slowed appreciably on the second and third laps. Having overtaken Street, Hugh Wheldon finished on 3 m 24 s with Street a further 3.6 s from Warren and Chapman, the Escorts being at a disadvantage in the by now muddy conditions.

BOB CONSTANDUROS

Philips Electrical Trophy, round 1 (aggregate of fastest two runs): 1. Nick Jesty (1.8 Mini) 6 m 12 s, 2. John Taylor (2.0 Escort) 6 m 15.8 s, 3. Hugh Wheldon (1.3 Mini) 6 m 37 s, 4. Gary Street (1.3 Mini) 6 m 44.4 s, 5. Rod Chapman (2.0 Escort) 6 m 49.4 s, 6. Peter Warren (1.8 Escort) 6 m 51.4 s.
Final: 1. Taylor, 3 m 12.2 s, 2. Jesty, 3 m 16.4 s, 3. Wheldon, 3 m 24 s, 4. Street, 3 m 37.6 s.

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Bruce Rushton gives some idea



on how not to go autocrossing.

The art of competing in autocross —

In this period of virtually no motor sport, some advice is given on how to start autocrossing cheaply

There was a time when autocrossing (racing on grass against the clock) was considered the sport for the poor man who could not afford to go motor racing. Ancient Ford Pops, a wide variety of special and standard Minis were the order of the day. Today, however, it is far more specialised but there's still room for the ordinary clubman who wants fun from his day out.

Forgetting all about the top boys who have special engines, special suspensions and just about everything else that is special, you can still get a host of entertainment from your car even if it is the wife's shopping car, for there's a class for them now.

Ideally an autocross car should be as

strong as a rally car, as light as a feather, and have the speed of a racer. For the purposes of this piece, though, let's forget about the ultimate and consider the basics.

By far the most popular form of autocross vehicle these days is the Mini. With a variety of engine sizes you can enter most events in one of three classes, up to 870 cc, up to 1000 cc or over the 1000 cc class. So, assuming that a Mini is the chosen transport, what does one do to make it at least a little bit competitive? Lightening the beast is the first thing to tackle and this means throwing away the lights, bumpers, trim and disposing of the heater, carpets, door trims, parcel shelves, plus the seat squab. If you can afford it you

can throw away the doors, bonnet and boot and replace them with alloy or fibreglass replicas, and a perspex windscreen is a worth while weight reduction. After chopping off all this weight one has to add a little in the form of a roll cage. Although not mandatory yet, they soon will be so get a proper one, not a bit of bent tubing. At the same time make provision for a full harness safety belt as lap and diagonal jobs are a waste of time when you're bucketing and "broncoing" round the course. Finally, and most important, don't forget to make provision for a bulkhead between the fuel tank and driver's cabin which is fire and liquid proof. While on the subject of fire prevention a small extinguisher located within the car, is a useful and sensible addition.

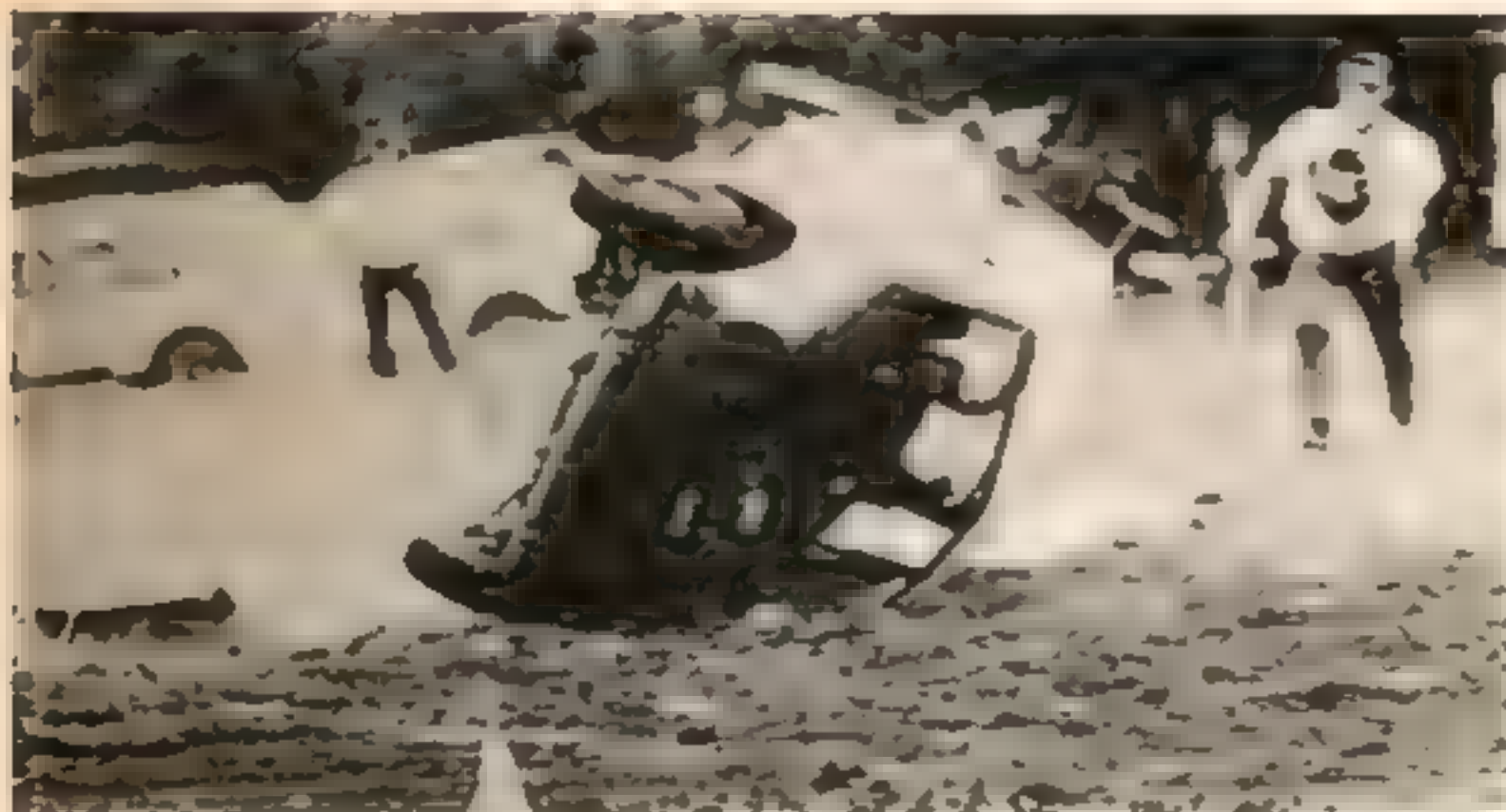
Now that we have sorted out the shell let's turn our attention to the engine, tyres and suspension. Obviously, in the former category you can't have too much power. But before making a decision don't altogether ignore bottom end power because when it rains you will look a right Charlie without the necessary urge low down. Tyres are a subject which cause much argument. One thing most people agree on, however, is that you need as much width as you can get in the wet and mud, chunky treads are the vogue

with a Mini. He escaped unharmed



from this roly-poly on Spring Bank Holiday Sunday and with . . .





the aid of a tractor the Mini was pulled back into shape for Bruce to take fourth fastest in a class of 29 on the following day! That's how cheap autocrossing can be



while "knobbles" are most frequently used in dry conditions when ruts abound. All the leading companies are among a complete list in the RAC Motor Sport Book of regulations (one of the first things you should acquire anyway) and the only other question to decide, on the day, is pressures. Experts using racing pressures—up to 40 lb in the dry—and go to the other extreme when it's wet. Now to the suspension, and the object here is to provide a happy medium between the vehicle's equipment and the conditions on the day. Main trouble is that what is right for the dry is invariably all too hokey for wet conditions and is a distinct embarrassment.

First thing, formulate some way of lowering the suspension and providing stiffer shock absorbers than already fitted. Best bet is to have a look at a car which is going well and ask the driver, if it's the same as yours, what he uses. It can save a lot of time and heart ache. You can fit wheel spacers to get the maximum width as another aid to stability but they must not be more than 1 in wide and if you are really affluent you can think in terms of mag alloy wheels, but not for the first event!

How you drive the car is purely a personal matter. You will soon learn your own technique and mysteries of left foot braking, power on with the handbrake on, see-sawing through a corner, will be explained as time goes by but inevitably the style which suits the individual will prevail.

To enter an autocross one must first join one of the many hundreds of motor clubs affiliated to the RAC. The majority run their own closed to club events in which one can gain valuable experience. There's no hard and fast rule as to the entry fees that may be charged, but expect to pay around £2.50 which will include insurance for the day. But it is advisable to tell your own insurance company what you propose to do if you are running a car already in use on the highways.

So far as personal preparation is concerned a crash helmet is a must, a pair of overalls advisable, though not obligatory but the arms must always be covered. Gym shoes are the most common footwear but not everyone wears gloves.

In conclusion, don't be late for the event. It can cause a lot of trouble as well as being discourteous. Remember to take along all relevant documents and expect a whole heap of bruises after your first day's autocrossing.

DEREK HILL

The 1974 BTRDA autocross dates

The 1974 Castrol/BTRDA Autocross Championship will consist of 22 rounds plus the final. Most important alteration is to reduce travelling between events at the two Bank Holidays at Whitsun and in August. On the former dates the events will be the PAN event followed by the Hagley round and in August the Bath and Taunton rounds will be on successive days. New clubs organising rounds are Cheltenham and Morecambe.

The full list of dates and clubs is as follows: April 21st White Horse MC; 28th Peterborough MC; May 5th Cheltenham MC; 12th West Essex; 19th Forest of Dean MC; 26th Potteries & Newcastle MC; 27th Hagley & Dist LCC; June 2nd Welsh Counties CC; 9th Chelmsford MC; 16th Morecambe CC; 23rd Midland Manor MC; 30th Exeter MC; July 7th West Suffolk MC; 14th Lancs & Cheshire CC; 21st Chess Valley MC; 28th Woolbridge MC; August 4th Quinton MC; 11th Winchester MC; 18th Rhyd & Dist MC; 25th Bath MC; 26th Taunton MC; September 1st Shenstone & Dist CC; 8th Dudley & District SS (final).

Rally cars included

Preliminary discussions are to take place between the BTRDA Autocross Committee and their opposite numbers on the Rally Committee to explore possible ways of including a class for rally cars in autocross events next year, in the event of the ban on rallies being continued.

Last season's autocross series proved to be one of the most popular and well organised so much so that much more sponsorship may be forthcoming in 1974. One of the companies currently discussing the situation is Lloyds & Scottish Finance Group of Edinburgh who may link with the successful HF Sprint Team of Birmingham.

● Liz Lyall, wife of autocrosser and quiz chairman Rob Lyall, has been appointed social secretary of the BTRDA Autocross Committee with special responsibilities for organising and co-ordinating hotel accommodation for competitors in the coming season.

Liz will also look into the possibilities of organising social functions in connection with events and also an end of season overseas party. She would like to hear from anyone with ideas at 117 Knowle Hill, Hurley, Atherstone, Warwicks, tel Hurley Park 535.

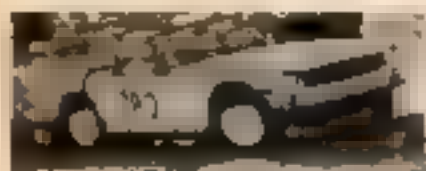
Revised BTRDA autocross rules

Minor alterations to the regulations for the coming season have been arrived at by the BTRDA Autocross Committee, the most important of which is to regionalise the championship so far as drivers are concerned if petrol rationing is introduced.

Coupled with the decision to limit a driver to events within a reasonable distance of his home base, and each driver will have to nominate the events he will be doing. It is also planned to limit a driver's best performance to six events, one less than the present arrangement. So far as the classes are concerned it is planned to split the standard class at 1600 cc if sufficient entries, about 12, are received at a round and the small Mini class capacity is being raised to 870 cc to allow standard oversize pistons to be used. The committee has decided that only two teams of three drivers will be accepted at each round and no driver can be included in more than one team. Arrangements are being made to run about six events on a four abreast basis using 880 yds courses at each event.

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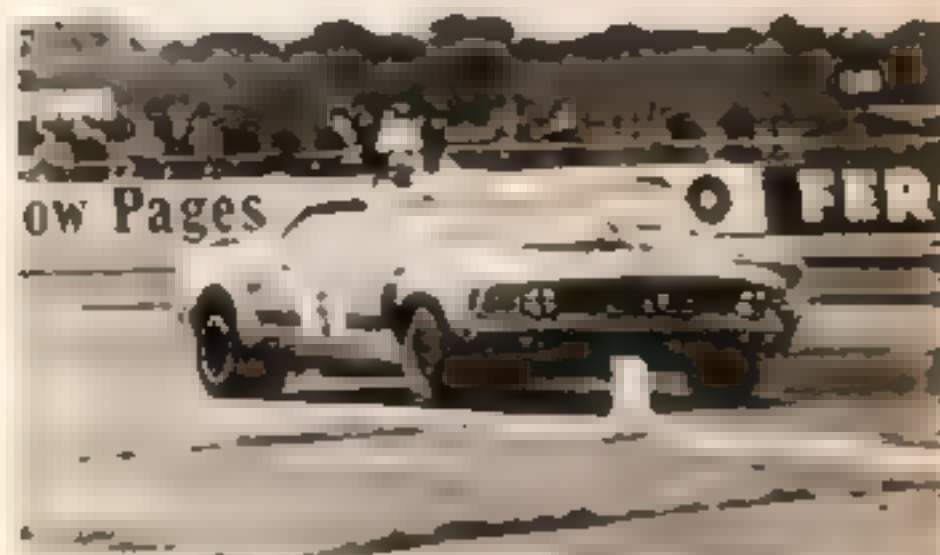
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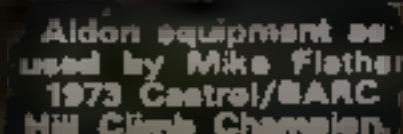
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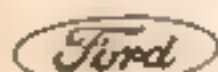
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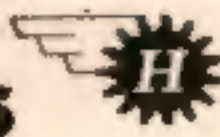
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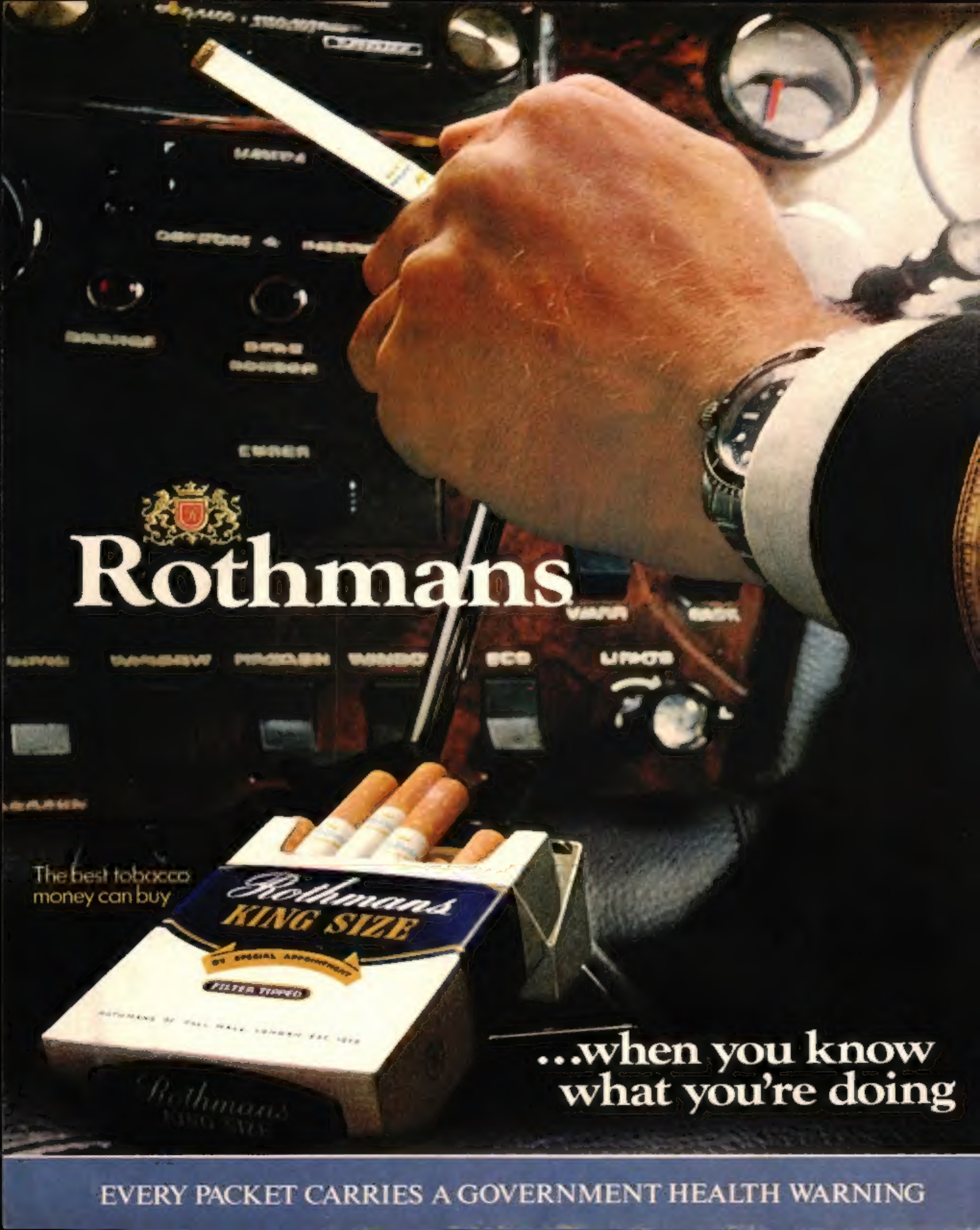
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